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"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

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THE PRESENT STATUS OF THE BAND-TAILED PIGEON ON THE PACIFIC COAST.

By WALTER P. TAYLOR.

Previous to Protection.

There is little doubt that at the time of settlement of the Pacific coast region the band-tailed pigeon was abundant; of this we have hints in the literature. Grinnell, Bryant, and Storer (The Game Birds of California, 1918, p. 580) assert that in earlier years in this state flocks of upwards of a thousand were occasionally observed. Suckley (in Cooper, Vol. XII, Bk. 2, Pac. R. R. Repts., 1860, p. 217) refers to flocks seen on stubble fields in the vicinity of Fort Steilacoom, Wash-

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ington Territory, in September, 1856, thought to contain at least a thousand individuals; and he was told that in the cultivated districts along the Cowlitz River they occurred in still greater numbers. In September, 1889, Dr. T. S. Palmer, of the Biological Survey of the U. S. Department of Agriculture, saw large flocks below Mount Vernon, on Puget Sound, Washington. As late as 1900 Kobbe (The Auk, Vol. XVII, Oct., 1900, pp. 351-352) reports large numbers of pigeons on Cape Disappointment, at the mouth of the Columbia River, when the salmon berries ripen in June and July. S. F. Rathbun, of Seattle (letter of June 27, 1923), says that thirty years ago the species was common all through the Puget Sound region. Much indiscriminate killing was done, and about 1905 a diminution in numbers was noticed, which became more apparent from year to year, until the band-tail became scarce in the Sound country, though still fairly plentiful in the Olympic Peninsula, where it was not hunted so much. W. T. Shaw reports that in 1906 the species was still quite abundant in the vicinity of Corvallis, Oregon, though it was said that its numbers had decreased much during recent years. In 1908 Edson (The Auk, Vol. XXV, Oct., p. 432) said the band-tail was common, but doubtless diminishing in numbers, in localities about Bellingham, Washington. Dawson, in 1909 (The Birds of Washington, p. 553), wrote that the pigeon was rapidly decreasing in numbers. In California Grinnell (The Condor, Vol. XV, Jan., 1913, p. 28) says it is morally certain that there has been a very great decrease in the numbers of pigeons since the early days of western settlement.

Although the size, numbers, and habits of the band-tailed pigeon make it an excellent game bird, apparently no protection was given it by any Pacific coast state until the year 1909, when Oregon accorded it a closed season from January 1 to September 15 (Oldys, Brewster, and Earnshaw, U. S. Dept. Agri., Farmers' Bull. 418, p. 19); in 1913 Washington gave the species a closed season (Darwin, Laws Relating to Game and Game Fish, 1913, p. 29); and in 1915 California followed suit. In the meantime the Federal Migratory-Bird Law was enacted (proclaimed and effective October 1, 1913) and the band-tail was given absolute protection for five years (until September 1, 1918). With the completion of the exchange of ratifications of the Migratory-Bird Treaty on December 7, 1916, the species was accorded complete protection for ten years from that date.

There is little doubt that the pigeon destruction of 1912 in the Paso Robles-Nordhoff district of California gave a powerful stimulus to the adoption of proper protection by the federal government and the State of California. Chambers (The Condor, Vol. XIV, May, 1912, p. 108) called emphatic attention to the slaughter of that year, writing that one hunter from Los Olivos shipped over 2000 birds to the San Francisco and Los Angeles hotels, and that the morning train from San Luis Obispo to Los Olivos on Sundays averaged 100 passengers who came to shoot pigeons. Deputy State Game Warden H. J. Abels, of Santa Maria, told me of examining the licenses of 500 shooters on one of these Sunday morning excursion trains. According to Forest Ranger Joseph J. Libeu, of Los Olivos, more than five tons of pigeons,

representing probably 10,000 individuals, were sent to the San Francisco and Los Angeles markets through Gaviota; he reports from 10 to 500 hunters in the fields daily. Counting automobilists and visiting hunters from Los Angeles, San Francisco, and other points, he believes that 25,000 to 30,000 pigeons were killed in that one season. Ranchers and sportsmen in the vicinity vividly remember the slaughter, and though practically all those interviewed in January, 1923, favor an open season, we found none who wish a repetition of the disgraceful proceedings of 1912.

Chambers' notice and other reports of the killing brought quick action. A closed season on the band-tailed pigeon in California was advocated by the Cooper Ornithological Club's Permanent Committee on Conservation of Wild Life, and made a leading item in the legislative program of the California Associated Societies for the Conservation of Wild Life. At the request of the Secretary of the State Fish and Game Commission, Dr. J. Grinnell prepared a paper on "The Outlook for Conserving the Band-tailed Pigeon as a Game Bird of California," which appeared in The Condor (Vol. XV, Jan., 1913, pp. 25-40). The California Legislature accepted the recommendations of the conservationists and passed the bill providing for the closed season, which, however, was not signed by the Governor, and failed to become a law. The California agitation of the subject was by no means lost, however, for it undoubtedly furnished an impetus to the adoption of the long closed seasons by the federal government.

Present Condition.

The consensus of opinion from Washington to California is that the band-tailed pigeon has markedly increased under protection. Some individual reports follow: In 1919 James Gibson, a resident of Orcas Island, Puget Sound, Washington, reported the species increasing and destructive to crops. The same year R. H. Anthony, County Game Warden of San Juan County, Puget Sound, said pigeons gather in flocks of thousands so that farmers enter numerous complaints. During September, 1919, a Biological Survey party working on Mount Rainier saw flocks of up to 100 band-tailed pigeons in a day migrating south, the observation of even such numbers of migrating individuals being reported unusual of late years. In the spring of 1922 Bowles (Murrelet, Vol. III, May, 1922, p. 7) found band-tailed pigeons more numerous in the vicinity of Tacoma, Washington, than he had ever seen them, though previous to protection they had been nearly wiped out. Kitchin (Murrelet, Vol. III, Sept., 1922, p. 14) also writes of the remarkable increase in their numbers in that vicinity. S. F. Rathbun, of Seattle, says more of the birds have been seen the past two years, and particularly during the season of 1922, than since about 1906. For a few years following their protection, says Rathbun, little increase was noted, at least in the Sound country, but in 1921 there was a marked increase, some very large flocks being seen which reminded him of the days when the species was so plentiful.

Stanley G. Jewett, of Portland, Oregon, whose opportunities for observation are of the best, says (letter of June 28, 1923) that the

band-tailed pigeon has been steadily increasing in that state since the Migratory-Bird Treaty Act went into effect; he believes that the birds have doubled in number during the last ten years. It is of interest to note that the species became sufficiently abundant in Oregon during the season of 1922 to warrant the issuance by the Acting Secretary of Agriculture of a statewide permit to landowners growing cherries or other small fruits to kill the birds for the protection of their crops between June 1 and July 15.

In California also there seems to be little doubt that the band-tailed pigeon population is considerably augmented. State Deputy Game Warden Henry J. Abels, of Santa Maria, near one of the principal pigeon wintering grounds in the state, in January, 1923, reported to the State Fish and Game Commission as follows:

"From personal observation I find that the pigeons have been continually on the increase during the past six years, due of course to the protection given them by both the state and federal laws. The pigeons have about come to their own again where they were before the big slaughter which took place some years ago in this county."

On December 24, 1922, at Zaca Creek, near Los Olivos, Santa Barbara County, Abels saw a flight of pigeons at least 150 yards wide flying upstream late in the afternoon, the flight continuing for half an hour. After this flight had passed "thousands" of birds were still observed in the lower Zaca, and often 50 to 200 individuals were to be seen in a single tree. Abels, though conceding that anything like an accurate estimate is impossible, thinks he saw 100,000 pigeons during the day. By January 20, 1923, when the writer was on the Zaca, the big flight had disappeared and only scattered individuals were present. In the vicinity of Atascadero, San Luis Obispo County, on January 23 and 24, the writer, with Wardens Abels and H. D. Becker, saw from 200 to 500 pigeons. Forest Ranger Joseph J. Libeu, of Los Olivos, does not think the pigeons are increasing, but his is almost the only dissenting voice in this section.

In the Ojai Valley, Ventura County, on January 26 and 27, Warden J. J. Barnett and the writer saw several large flocks of 50 to 500 individuals each, perhaps 2000 birds altogether. Mr. Barnett reports that in 1922 pigeons occurred clear across the Santa Clara valley for the first time in more than ten years.

Allen Chickering (The Condor, Vol. XXV, Mar., 1923, p. 67) is of the opinion that band-tails are increasing in California in localities from as far north as Fort Ross and the Russian River south to Pasadena. State Deputy Game Warden Webb Toms, of San Diego County, and the writer saw flocks ranging in numbers from a few birds up to 300 individuals in the vicinity of Pala in that county about the first of June, this year (1923). Dad Adams, of Pala, said the pigeons are much more numerous now than they had been during the previous eight years that he had been there. Dr. H. C. Bryant (letter of June 27, 1923) reports the pigeons abundant in Yosemite Valley this season. Dr. Grinnell (letter of August 11, 1923) found the species present in all parts of California he has visited, in what appeared to be well-nigh maximum numbers. Localities cited include the vicinity of Sites, western Colusa County; Dudley, Mariposa County; the south fork of

the Eel River; the Van Duzen River; and points between Alton and Eureka, in Humboldt County. It is Dr. Grinnell's opinion that the species has greatly increased since 1912.

For the rest of the geographic range of the band-tailed pigeon we lack data on which to form any very positive conclusion. Dr. W. H. Bergtold (letter of June 28, 1923) reports the species very uncommon in Colorado, with no change in status so far as he can see. Aldo Leopold (letter of July 6, 1923) has observed numbers of the species in New Mexico as follows: On the Pecos River and in the Jemez and Mogollon mountains (Gila Forest); White Mountains (Lincoln Forest); Sandia Mountains (Manzano Forest); and the Sacramento Mountains (Lincoln Forest). He has also seen them on the Apache Forest, the White Mountains Indian Reservation, and the Santa Catalina Mountains, in Arizona. In his opinion the birds are on the increase, or at the very least holding their own. Deputy United States Game Warden B. R. Britton (letter of August 31, 1923) writes that, judging from conversations with observant outdoor men, he thinks the band-tailed pigeon is rapidly increasing in New Mexico. Dr. Chas. T. Vorhies and the writer have noted the species in the Santa Catalina and the Santa Rita mountains near Tucson, Arizona, but lack the data for an estimate of comparative numbers.

Damage by Band-tailed Pigeons.

Reports of depredations on various crops by band-tailed pigeons date back at least to 1860, when Cooper (Pac. R. R. Repts., Vol. XII, Bk. 2, p. 217) wrote that they do much damage to fields of grain in Washington Territory. After careful canvass of the situation in California, Grinnell, Bryant and Storer (The Game Birds of California, 1918, p. 586) conclude that the actual loss inflicted by pigeons is very small. Since reports of damage will of a certainty become more numerous and insistent with the increase in numbers of the birds, brief reference to some recent reports of depredations will be worth while. Gibson and Anthony, Washington State correspondents of the Biological Survey, have reported damage to crops on islands of Puget Sound. The County Game Warden of Mason County, Washington, told D. E. Brown, of Seattle, on August 13, 1917, that the band-tails caused farmers much trouble by digging up their seed. S. F. Rathbun has noted flocks of upwards of 200 birds feeding in newly sown grain fields in the Puget Sound region, and has heard numerous reports of damage. Other farmers in similar situations reported no damage from pigeons.

Stanley G. Jewett reports from Oregon that many reports of depredations in grain fields early in the spring and to a lesser degree on cultivated cherries have come in, but on examination, it is invariably found that the damage is greatly exaggerated.

C. C. Sperry, of the Biological Survey, recently investigated reports of damage in Oregon, and W. F. Kubichek, of the same bureau, in Colorado. As already mentioned, only one state-wide federal permit to kill band-tailed pigeons has been issued—that in Oregon State, already referred to.

In Humboldt County, California, Dr. Grinnell heard many complaints of band-tailed pigeons having done damage on newly sown grain fields and cherry orchards in the spring of 1923.

On December 30, 1922, a strongly worded telegram (CALIFORNIA FISH AND GAME, Vol IX, April, 1922, p. 57) was addressed to the Secretary of Agriculture, reciting that by reason of the large numbers of pigeons the farmers were unable to plant their grain, and asking for an immediate opening of the season for killing them during the months of January, February and March, with a limit of 50 birds per hunter and no limit on farming land where permission is obtained from the farmers. The telegram was signed by 18 persons, all but two listed as ranchers of Santa Maria, Santa Barbara County, California, and vicinity. Game Warden Abels and I interviewed many of these men. The petition had been circulated by sportsmen, though their names did not appear as such, and the ringleader's name did not appear at all. One man's wife had signed for him; another man's brother-in-law "kind of forged his name" to the petition; one man was busy when the petition was brought round, and signed without reading it; another signed in the dark; still another said he would not have signed if he had thought there was any chance of the petition going through, for, he said, in 1912 the shooters on his ranch did more damage than the pigeons. Although we traveled over parts of three counties, we did not find a single farmer who reported damage to grain this year. The crop and stomach of a pigeon secured at Atascadero did, however, contain 430 kernels of wheat. Thirteen stomachs and crops of pigeons taken in the Ojai Valley contained remains of acorns, toyon berries (*Heteromeles arbutifolia*), buds and staminate blossoms of oak, and one cluster of walnut flowers, no grain whatever appearing, although there were extensive tracts in the immediate vicinity, the succulent shoots of barley were two or three inches high, and some waste grain still lay on the surface of the ground.

In June, 1922, pigeon damage in the San Luis Rey Valley, San Diego County, was reported to the Biological Survey by Forest Supervisor S. A. Nash-Boulden, of the Cleveland National Forest. Investigation in June of the present year (1923) showed that although pigeon depredations were real, they were limited to a very small area (about 100 acres) near Pala, at the base of Palomar Ridge. At this point the San Luis Rey Valley is about three miles wide, and the grain fields, which are of limited extent, are surrounded by wild country. The cottonwoods, alders, willows, and sycamores of the San Luis Rey River afford plenty of shelter for the birds when attacked or frightened. Wild native fruits were scarce. Palomar Mountain, where the pigeons were evidently nesting, is but a few miles distant. Under these circumstances it is not strange that the 200 to 300 individuals apparently summering in the Palomar region should descend to feed on the wheat and barley. The grain is not eaten to any extent until it is in the shock. Then the pigeons alight thickly all over the shocks and pick the grains from the heads. The percentage of wheat in 28 stomachs and 26 crops averaged 77, while numbers of kernels of wheat in a single crop ran as high as 457. Other food materials found in the stomachs and crops, in the order of their proportion of the total contents, were green elderberries, barley, manzanita berries, acorns, oats, yucca flower, staminate flowers of oak, unidentified vegetable matter, and a couple of seeds of *Stipa* grass. At this time, therefore, on this area wheat made up three-quarters of the food.* T. B. Bruce, the farmer principally affected,

*Stomach analyses quoted in this paper were made by E. R. Kalmbach, of the Biological Survey.

estimated his total loss the last two seasons at $150 on approximately 100 acres of grain. In 1920 J. C. Adams, a neighbor of Bruce, had 400 acres of grain and is reported to have suffered a loss of from $500 to $1,000. The use of the combined harvester, which does away with the need of shocking grain, has prevented any further losses on the Adams ranch. There is a good deal of grain through the back country of San Diego County, much of it not far from mountains where the band-tailed pigeon is known to summer, but no other damage has been reported. In connection with the food preferences of the pigeon it was noted that the species greatly prefers wheat to barley.

Aldo Leopold has been keeping track of cases of damage in New Mexico, and has never found but one that he was sure amounted to anything. The pigeons sometimes flock in considerable numbers to a commercial cherry orchard at Highrolls, Otero County, and do considerable harm. United States Game Warden B. R. Britton of Socorro, New Mexico, reports the loss of at least one-third of a crop of cherries on the W. A. Williams Ranch, near Santa Fe. He also found pigeons doing damage to ripening wheat on the Keller Ranch, in the vicinity of Nogal, New Mexico, where it is said that the previous year the birds attacked the wheat in the shock. They were thought to have destroyed one-third of the crop. Britton believes that most complaints of damage are inspired by "would-be sportsmen," who are only too willing to kill pigeons if the farmer will get a permit.

There is no question that a farmer suffering bona fide damage to his crops should have the right to protect himself, as every observant person must realize the farmer has been and is having a hard enough time without having his crops eaten or his margin of profit reduced by birds or animals. The Federal Migratory-Bird Treaty-Act Regulations make provision for issuing permits after investigation has demonstrated that real damage is being done, and each state in which the pigeons may become seriously injurious to agriculture under extraordinary conditions might well have upon its books a similar law.

The Future.

It is well known that the band-tailed pigeon is erratic in its distribution, especially in winter, its occurrence depending very much upon the food supply. This irregularity complicates the problem of estimating the relative numbers of the species. The practical unanimity of reports of its marked increase in numbers from many observers at widely separated points seems to indicate, however, that the pigeon has responded to protection in a highly satisfactory manner.

In California there is already considerable sentiment for an open season on the species. In view of the fact that the pigeon should be given the benefit of every doubt, it is perhaps not altogether unfortunate that the period of total protection under the Migratory-Bird Treaty is to run for three years more, or until December 6, 1926. The closed season will continue, of course, even after this date, unless an amendment to the Migratory-Bird Treaty-Act Regulations to the contrary is adopted by the Secretary of Agriculture and approved by the President.

If an open season is provided for, what is the proper time of year for it in the different states affected? Most of the pigeon population

leaves the State of Washington during September, some of the birds lingering in Oregon until the last of November. It is questionable whether the species is numerous enough at present to warrant an open season in Arizona and New Mexico. Chase Littlejohn has found a half-incubated egg of the pigeon near Redwood City, California, as late as August 23, 1914 (Grinnell, Bryant, and Storer, The Game Birds of California, 1916, p. 582). If this egg was half-incubated, the young bird would not have been hatched much before the first of September, and if the squab remained in the nest a month, it would not have left before October 1. While Littlejohn's record may be exceptional, the season should certainly not open before this date. State Deputy Game Warden Abels suggests an open season between November 15 and February 15, which would cover the period of possible winter damage.

It is clear, however, that unless an earlier season were given the band-tail in Oregon, Washington, Arizona, and New Mexico the sportsmen of those states would be eliminated, so far as the band-tailed pigeon is concerned. However the matter is arranged, it looks as though the sportsmen in the winter range of the species in California would gain more from an open season than those of any other part of the state or any of the other states in which the bird is found.

Summary.

1. From a condition of early abundance the band-tailed pigeon, lacking legislative protection, undoubtedly suffered a considerable decrease in numbers through unrestricted shooting. The pigeon slaughter of 1912 in the Paso-Robles Nordhoff region of California led to strenuous agitation for its protection in California, and indirectly to the enactment by the Federal Government of long closed seasons on the bird.

2. The consensus of opinion from Washington State to California, and, somewhat less definitely, east to New Mexico, is that the band-tailed pigeon has responded markedly to protection by an increase in number, especially during the last few years.

3. Reports of damage by band-tailed pigeons are bound to increase with the augmenting numbers of the birds. There is no doubt that the band-tail does some harm, both to grain and small fruits. But in the aggregate the losses do not, as yet, bulk very large, and most of the reports are exaggerated. Apparently most of the bona fide damage cases can be readily handled as contemplated by the Federal Migratory-Bird Treaty-Act Regulations by the issuance, after investigation, of permits to individuals in certain areas to kill birds which are seriously injurious. The prompt handling of cases of damage would be facilitated if provision similar to this could be made in the laws of states in the geographic range of the pigeon.

4. The irregular movements of the band-tailed pigeon make difficult a satisfactory estimate of its relative numbers. Although sentiment for an open season on the species is increasing, especially in California, it is probably a good thing that the ten-year closed season runs for three years yet, or until December 6, 1926.

5. The close season will continue, even after the expiration of the ten-year period, unless an amendment to the Migratory-Bird Treaty-Act Regulations shall be adopted by the Secretary of Agriculture and

approved by the President. Since the band-tailed pigeon is a summer resident only in Oregon, Washington, Arizona, and New Mexico, but occurs in California throughout the year, there is little doubt that an open season would be of greater benefit to the sportsmen of the winter pigeon districts of California than to those in any part of the range of the species in the United States.

6. The case of the band-tailed pigeon justifies some optimism as to the future of threatened species of wild life, if adequate legislation can be enacted and sufficiently enforced.

AN EXPERIMENT RELATING TO THE HOMING INSTINCT OF KING SALMON.

By JOHN O. SNYDER and EUGENE C. SCOFIELD, Stanford University.

It is well known that artificially propagated king salmon will return from the sea when mature, entering and migrating up the river in which they were reared during the fluvial period of their life. But it is not known whether these returning fish will always seek out and enter

FIG. 1. Klamathon racks and the State Fish and Game Commission's salmon egg-taking station. Marked salmon have been trapped here.

the particular tributary in which they were reared, nor is it known how such fish will act if, after having been reared in the water of one tributary, they are introduced into that of another just previous to their seaward migration. These are matters of importance in the propagation of salmon, and together with many other problems of a similar sort, are engaging the attention of the Fish and Game Commission. An experiment, the expected results of which will bear directly on the above questions, is here outlined, and some notes relating to the young of king salmon are presented to the reader.

Klamath River in Siskiyou County was selected as the place of operation, the conditions there being ideal for this particular experiment, which consisted in marking yearling salmon and introducing them into tributaries of the river at certain places.

The Commission maintains a hatchery on Fall Creek, a tributary of the Klamath, and an egg-collecting station on the main river at Klamathon near the town of Hornbrook, both of which are under the able supervision of E. V. Cassell. The Klamathon racks are so placed in the river as to trap every salmon which passes up during most of the fall migration, thus enabling an observer, if he desires, to examine individually the migrating fish. A particular fish in entering the trap may be held for a period between the racks, or it may be passed on and allowed to pursue its way up the river. About fifteen miles above the racks is the great Copco dam which abruptly transforms the river into a deep lake of considerable length, and at the same time presents a barrier which is impassable to all migrating fish. About two miles below the dam, Fall Creek enters the Klamath. This is a large, perennial stream of clear, cold water with a high fall at a point about a mile above its mouth. The hatchery is located near the foot of the fall. The

FIG. 2. Inspecting the salmon trapped between the racks. All salmon migrating up the river at this point may be examined.

creek below the fall is small and clear enough to permit of inspection throughout its length, and salmon which enter it may be easily seen and taken if occasion warrants. Jenny Creek, a stream similar to Fall Creek, but unfortunately without barriers, enters the main river somewhat over two miles below the mouth of Fall Creek. It is not inhabited by king salmon, but there is no apparent reason why such fish should not enter the stream and spawn, and it is quite probable that they would if propagated there as in Fall Creek. For a short distance above the mouth of Jenny Creek the water is relatively deep, thus supplying a suitable area for the operation of gill nets. Several miles below the racks, Shasta River enters the Klamath. It is a stream famous for its trout and salmon. During the fall migrations it is frequented by fishermen. Many salmon are taken and it is presumed that if marked fish should enter the river in numbers, a few at least might be secured.

The young salmon used for experimental purposes were taken from the large number regularly reared at the Fall Creek hatchery. They

were hatched from the eggs taken during the previous season at the Klamathon racks. When marking operations were begun the little fish were being held in the rearing ponds near the hatchery.

These ponds, irregular in shape and of variable depth, are in places bordered and overhung by bushes and trees. An abundant supply of fresh water flows in at one end. In a measure they simulate the pools of a river offering the little fish a choice of shallow or deep water, of sunshine or shade, and even a small waterfall against which they may

FIG. 3. The junction of Jenny Creek with Klamath River.

jump. Although the fish are fed at regular intervals, they get some practice in the capture of insects and other minute forms which either fall upon the surface or are carried in with the flow of water. In so far as one is able to observe, they behave like wild fish, the smaller ones keeping together, the larger ones seeking deeper waters—all ready to dart from a moving shadow or the approach of a strange object. They are protected from voracious trout, but they are not entirely free from the occasional visits of the green herons, kingfishers and water ouzels or possibly a prowling mink.

The pond fish vary considerably in size, possibly more than wild fish as is illustrated by the following table.

Total length in millimeters	Number of specimens		
	Ponds, Fall Creek Hatchery, Oct. 1	Overflow pool, Sacramento River, Collinsville, June 22	Mad River, near mouth, July 1
48	2		
49	2		
50	3		
51	3		
52	3		
53	7		
54	10		
55	8		1
56	7		1
57	14		
58	9		1
59	8		3
60	12		1
61	6		3
62	7		6
63	10		5
64	10		2
65	11		11
66	12	1	6
67	10		3
68	15	1	4
69	7		6
70	7		10
71	9		1
72	11	1	4
73	6		3
74	12	1	1
75	12	1	1
76	9	1	1
77	8	9	
78	4	7	
79	4	3	
80	4	3	
81	6	7	
82	2	7	
83	7	9	
84	4	4	
85	2	8	
86	1	7	
87	6	5	
88		4	
89		6	
90	1	7	
91	1	1	
92		2	
93	1	2	
94		2	
95	1	1	
96			
97	1	3	
98		1	
99			
100			
101			
102	1		
103	1		
104	1		
105			
106			
107			
108			
109			
110			
111			

Total length in millimeters	Number of specimens		
	Ponds, Fall Creek Hatchery, Oct. 1	Overflow pool, Sacramento River, Collinsville, June 22	Mad River, near mouth, July 4
112			
113			
114	1		
115	1		
116			
117	1	1	

This may be due to crowding and artificial feeding. The food is scattered on the surface, and some individuals more apt at securing it, grow more rapidly than others and are soon able to actually crowd the

Fig. 4. Pond at Fall Creek Hatchery. The pond closely resembles a natural pool in the river.

smaller ones aside. This is illustrated when a net is dipped into a mass of feeding fish for it brings in larger fish from the food center than elsewhere. Cannibalism on the part of the largest fish was suspected, but no evidence was obtained in the support of it. On the contrary, stomachs of large fish yielded no fish remains. As a further test, five fish measuring about 150 millimeters in length were placed in a trough with twenty-five others which measured no more than 50 millimeters. All were left without food for seven days, during which time the small ones remained unharmed. The large ones were then transferred to a trough with several thousand fry and left for a day, at the end of which they were fed. Dissection showed their stomachs full of food but without fish remains. While we were observing a pond, a large fish was seen attempting to swallow a smaller one. On close observation the smaller one proved to be a wounded fish, probably having escaped from a kingfisher.

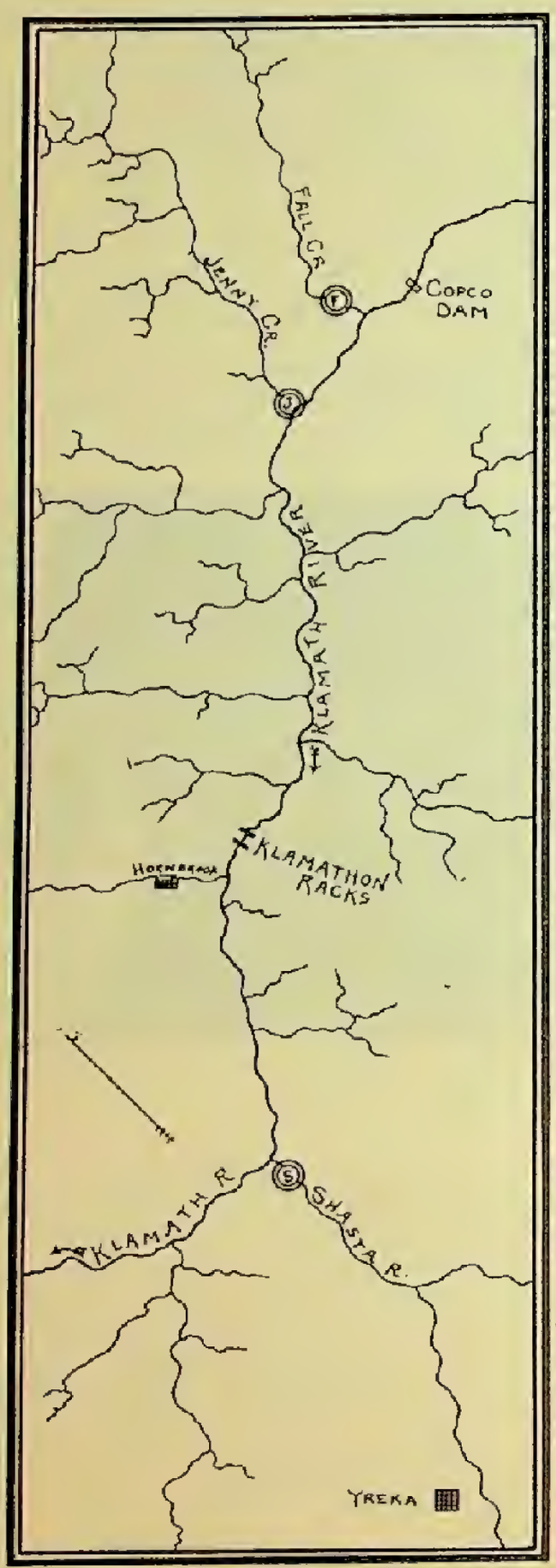

FIG. 5. Map showing location of salmon spawning and marking experiments on the Klamath River.

The supply of water which passes into the pond falls about three feet from the end of the flume. At most any time, and especially in the sunshine, many of the little salmon may be seen leaping into or near the miniature water fall. Some, in their attempts to ascend it, are able to rise eighteen inches or so. An observation in 1922 seemed to indicate that these leaping fish were precocious males like those described elsewhere, but an examination of many individuals which were caught at different times by allowing them to drop into a ringnet placed just behind the falls, disclosed sex characteristics which did not materially differ from those prevailing elsewhere in the pond.

Fish were not seen clustering around the outlet of the pond, and when placed in a hatchery trough they were inclined to crowd toward the inflow end. Yet when introduced into the creek they soon began to drop with the current, even though at first many of them were inclined to shoot up stream.

Precocious males are frequently found among the pond fish. Some of these measure no more than two and a half inches in length, yet they are none the less mature, and milt capable of fertilizing eggs may be obtained from them in the usual way. It has been demonstrated* that males may return to normal. There is no reason to presume that they die shortly after the breeding season as do the older fish, or that they fail to migrate to sea. Similar ripe males have been found in the estuary of Klamath River, but none was seen among many yearling males taken in Eel, Mad, or Smith rivers. The precocious males may be recognized by their color,

*Rich, Willis; Bulletin Bureau of Fisheries, xxxvii, 1920, p. 67.

which in general is a little more intense, the spots being somewhat more conspicuous, the paired fins bright lemon yellow, the other fins slightly tinted with yellow, and the under surface occasionally suffused with the same. Some examples measure deeper in the abdominal region, a few being seen that were much puffed up because of the greatly enlarged testes. Because of the variable size of both ordinary and precocious males we could not definitely determine whether either was generally larger in size. Some slight differences in the contour appear as are indicated in the following table, but these are not constant.

	Average of 20 precocious males	Average of 20 ordinary males
Length of body in millimeters	84	83
Length head in hundredths of body	.278	.275
Depth body	.286	.251
Depth caudal peduncle	.080	.081
Length snout	.07	.068
Depth head	.196	.176
Snout to dorsal	.496	.487

Mr. Cassell fertilized some eggs with the milt of precocious males in 1922, and reared and held the resulting fish until the following fall, when they were placed at our disposal. No external differences were found between these and ordinary hatchery fish. Dissection showed that the percentage of females was greater in the progeny of the precocious males than in the case of ordinary hatchery fish of the year. But this does not seem to be out of the ordinary when compared with the sex variation which appears in other groups of young salmon. No precocious males were reported among fish marked here in 1919.

	Number examined	Females, per cent	Males, per cent	Precocious males, per cent of all males
Fall Creek Hatchery, Sept., 1922	251	48.61	51.39	20.46
Fall Creek Hatchery, Nov., 1923	200	43.14	56.86	23.40
Fall Creek Hatchery, progeny of precocious males	240	52.50	47.50	4.38
Fall Creek Hatchery, Sept., 1919	200	54.50	45.50	0
Sisson Hatchery, Sept., 1920	119	35.84	64.16	0
Klamath River Estuary, Sept., 1919	49	42.80	57.20	0
Klamath Estuary, Sept., 1920	53	45.30	54.70	0
Klamath Estuary, Sept., 1921	100	43.00	57.00	0
Sacramento River, Collinsville overflow pools, June, 1922	104	50.96	49.04	0
Van Duzen Creek, Eel River, July, 1919	80	53.00	47.00	0

The marking of fish for experimental planting was performed in the usual way, two fins being removed in each case. The amputated fins were cut clean and close to the body, and every precaution was taken to prevent the accidental escape or wrong transfer of marked individuals; 25,000 were marked by removing the adipose and right ventral fins. These and 3000 of the progeny of precocious males with the posterior half of the dorsal and left ventral fins removed were turned into Fall Creek at the same time that many thousand normal fish were released. The adipose and posterior half of the dorsal fins were cut from another 25,000 which were then introduced into Jenny Creek at a point a few hundred yards above the junction of the creek with the river. Still another 25,000 were marked by removing both ventral fins. These were transferred to Shasta River and placed in the stream

above the highway bridge nearly a mile from the mouth. With the skillful management of Mr. Cassell all these fish were transferred and planted without loss, and shortly after their entry into the stream, they began to feed, scatter, and otherwise behave like wild fish.

If the experiment is successful a number of Fall Creek fish will mature and return from the sea in due time to be intercepted in their nuptial migration by the racks at Klamathon. This we may confidently expect from previous experience. After inspection these will be allowed to continue up the river. If they enter Fall Creek, as they probably will, they may be easily recovered there. If fish bearing the Jenny Creek mark also appear at the racks they may be helped over, and permitted to pass on to their destination, and we shall be able to

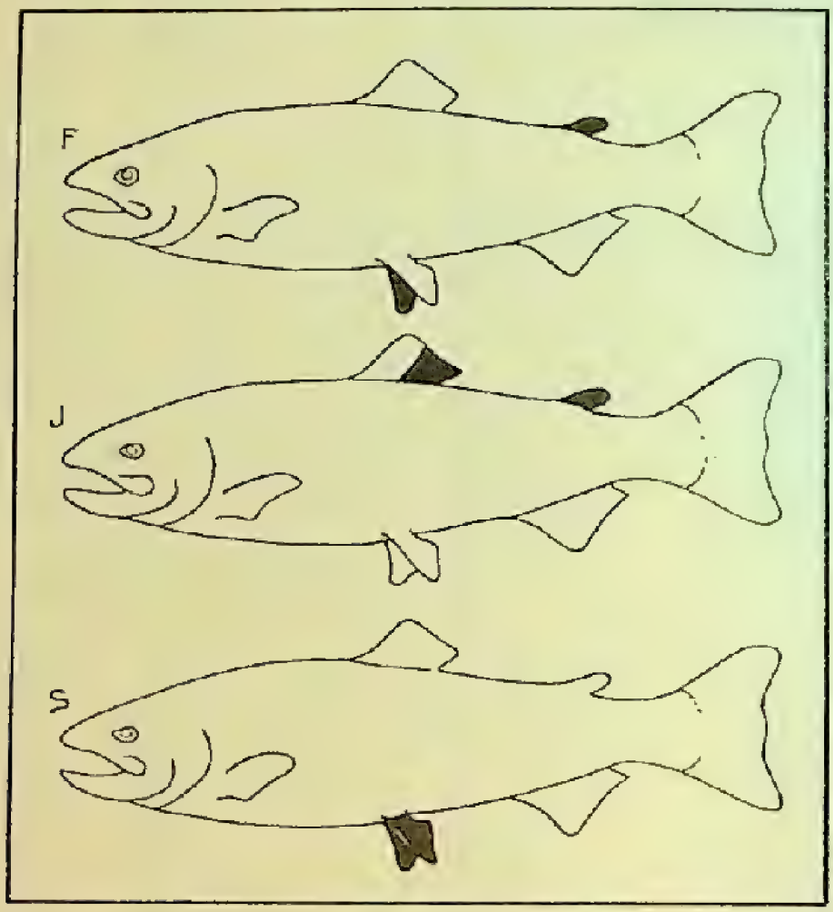

FIG. 6. Diagram showing how various lots of salmon were marked in experiments on the Klamath River.

tell whether this shall be Jenny Creek, Fall Creek or neither. If Shasta River fish do not appear at the racks and the others do, we may of course infer that they have gone elsewhere to spawn, and there will be some chance of recovering one or more if they should enter Shasta River in numbers. Some of these marked fish may be taken at sea and thus bring to us a little more information concerning their ocean movements.

It is quite apparent that the successful termination of work of this kind depends not only upon the willing cooperation of Commission officials, but of the fishermen and anglers as well, and the concern with which results are awaited may be appreciated by those interested in the behavior of living things.

Brief Summary of Marking Experiment.

Adipose and right ventral fins removed.

Released 25,000 fish in Fall Creek at the hatchery.
October 8, 1923—at F on map.

Adipose and posterior half of the dorsal fins removed.

Released 25,000 fish in Jenny Creek at highway bridge.
October 4, 9 and 11, 1923—at J on map.

Both ventral fins removed.

Released 25,000 fish in Shasta River, 0.8 of a mile from the mouth, near highway bridge.

October 5, 10 and 14, 1923—at S on map.

Posterior half of dorsal and left ventral fins removed.

Released 3000 fish in Fall Creek, the progeny of precocious males.
October 8, 1923.

FIG. 7. Shasta River seen from the highway bridge. Marked salmon were introduced just above the rocky bar.

DEER HUNTING IN CALIFORNIA.*

By J. S. Hunter, Assistant Executive Officer, California Fish and Game Commission.

California is not regarded in the East as a state where good deer hunting can be found, but there is probably no state in the Union that kills as many deer during the open season as we do. Each year from fifteen to twenty thousand deer are bagged by lucky California hunters.

In spite of this large number, our deer are holding their own. The reason for this is that California is a natural deer state and has an abundance of rough brush-covered country where deer can lead an almost undisturbed life. We say, "almost undisturbed," for there are many hunters pestering around after their scalps during the rather long open season.

Deer hunting in California is not limited to a few districts. Wild deer may be found in every county of the state with the exception of San Francisco and possibly Imperial. In some counties, of course, deer are not so abundant as in others, but good deer country can be reached within a few miles of any of the populated centers. In fact, not a few deer are killed each year within ten miles of San Francisco, and over 2000 are killed within 100 miles of the very heavily populated Bay region. There is probably no other densely settled district in this country that can boast the same record.

There are two distinct species of deer and a number of subspecies found in the state. In the northeast corner on the easterly slope of the Sierra is found the big mule deer, called "mule deer" on account of the shape of the tail and also of the ears. The range of this species extends somewhat on the west slope of the Sierra, but it is not as common as the black tail. Some hunters claim that in the district where the two species overlap there is a "bench-legged" deer—that is, a cross between the two species. Such reports have not been verified. The black tail is found south along the Sierra at least to Nevada County and has been reported even farther south and on the coast south to San Luis Obispo County. This species becomes most abundant in the upper coast region, where there are probably more deer to the square mile than in any part of the state.

In the southern part of the state the southern mule deer is most common. This is a small variety of the big mule deer. Its range reaches into the Sierra and as far north on the coast as San Luis Obispo.

In former years a third variety of mule deer, the burro deer, was found in the extreme southeastern part of the state. This form is still common in Lower California, but it is very scarce, if not extinct, in California.

There is reason to believe that the western white tail may be found in the northern part of the state. Horns of this species have been found in Modoc County and specimens have been taken not far north of the California line, but there have been no records of any having been killed in California.

There is a great difference in the size of the various species of deer. The largest is the big mule deer from the Modoc region. One has been reported that dressed 420 pounds, but this weight was not verified.

*This article was originally published in *Motor Land*, 13 (Sept. 1923), pp. 12–14, 40. A few slight changes have been made in the text.

Dr. Tinsman of Adin will vouch for one that dressed 380 pounds. I have a picture of the head of a mule deer that dressed 350 pounds. Such weights are not common. Any mule deer that dresses over 250 pounds can be considered a very good deer.

The black tail is a smaller species. Bucks have been killed in Monterey County that dressed slightly under 200 pounds. One, a stag, dressed, with head and legs off, weighed 178 pounds. A forked horn killed in San Mateo County several years ago dressed, weighed 187½ pounds. The average black tail will not run above 125 pounds dressed. Sometimes very small deer of this species will be taken. A forked horn killed this year in Sonoma County was estimated to weigh only 35 pounds. It is probable that this was a last year's fawn, that was unfortunate in developing a fork, rather than the usual spike. The southern mule deer is approximately the size of the black tail.

In spite of the fact that deer are one of the most common wild animals, there seems to be considerable ignorance regarding their habits. Very frequently the question is asked, "Do deer shed their horns each year?" In our species usually the males only are horned, but sometimes it will happen that a female will be found with well developed antlers. Whether these does are sterile, we do not know, but it is quite probable. More rarely a buck will be found without horns.

Normal males develop a new set of horns each year. Those of the yearling bucks are usually spikes, but the yearling of the big mule deer have forked horns, or two points on each side. Horns are shed each year, except by the stags or sexually imperfect animals. With these the horns are practically always in the velvet. Shortly after the horns are dropped in the early spring, usually around February, the new growth commences. At this time, deer are commencing to lose their winter coat and assume the red color of the summer deer. While growing, the horns are covered by a rather thick skin called "velvet." They grow very rapidly and are filled with blood and nerves and are extremely sensitive. The bucks at that time keep clear of brush and stay in the open. Within six months they are fully developed and velvet peels off. The bucks are then approaching the rutting, or breeding, season. They have lost their summer hair and are what the deer hunters call "in the blue."

As the rutting season comes on, the necks of the males swell and they become very pugnacious. It is unwise to fool around a rutting buck, as they put up a vicious fight. The rutting season varies in different parts of the state. The earliest rut is in Marin County. There it is not unusual to find swelled necks in the latter part of August. This same condition is more or less true for the adjoining counties to the north. The season advances, however, in the northern part of the state and in the Sierra region, where the rut does not commence until the first of November. In the Sierras deer in the lower country may rut a month ahead of those at higher elevations.

Fawns are usually born from April to July, but sometimes much later. There is a record of fawns, that were not over two weeks old, having been seen in Monterey County in December. When the fawns are born they are a reddish color, with distinct whitish spots. This gives them a protective coloring that enables them to hide in very scant grass or brush. At this time, also, fawns carry no scent, which gives them additional protection from natural enemies. The mother deer

stays with the fawns for several months. During their early life, when she finds it necessary to go visiting, or elsewhere, she may hide her young until she returns. Frequently well-meaning but misinformed humans find the little fellows, jump to the conclusion, on account of the fact that young fawns are weak-legged little creatures, that they are half starved and the mother has met a violent end. Of course they are so pretty they must take them home. In most instances, if the fawns were left alone, the mother would in due time come back and take care of them. The best thing to do when you find a fawn in the woods is to leave it alone.

The hunting season in California has been fixed before the rut. We differ in this from most of the eastern states, where the season almost invariably follows the rut. There are arguments for both seasons, but we believe our season is best. After the rut the deer are in poor physical condition. The meat is strong and when there is snow on the ground, they are much more easily killed. It is true that after the rut the bucks have fulfilled their duties as breeding animals, but in California we protect a certain class of bucks, which assures a crop of fawns. If killing is allowed during the running season, too many bucks will be killed. A few years ago, while in Monterey County, the writer saw three good sized bucks with one doe. They were so intent upon their own affairs that no attention was paid to the writer. All three could have easily been killed. A rutting deer is a foolish deer.

In spite of the fact that deer have been heavily killed in California for over fifty years, they are more abundant now than at the time the hide hunters were working in the '80's. During the hide hunting days, deer were killed by the thousands in all parts of the state. One San Francisco firm in 1880 handled 35,000 hides taken from Siskiyou, Trinity and Shasta counties. Two men are reported to have killed 3000 deer in one year in northern California and southern Oregon. Such killing would certainly have led to extermination in a comparatively short time, but fortunately the price secured for the hides was very low, about 50 cents each, and as deer became scarcer it was no longer profitable; hunters were forced into other work. Deer were so reduced in numbers that in 1888 the Fish and Game Commission recommended to the legislature that a closed season be established.

The first law protecting deer was enacted in 1872; does were given a four-year closed season, and fawns protected throughout the year. In 1883 the season was shortened by taking off the last two months of the year and does were given entire protection. In 1891 the legislature passed a law protecting deer for two years.

No limit to the number of bucks that could be killed was established until 1901; three then was fixed as the legal number. In 1905 the limit was cut to two. At nearly every session of the legislature, the open season has been more or less changed, but in general it has been some time during the months of July, August, September and October.

Additional protection was not given until 1915. At that time the law protecting the spike bucks was enacted. Although, as will be seen from the above, deer have received protection for more than fifty years, there was comparatively little enforcement of the law until 1907, when the passage of the hunting license act provided enough funds for the employment of very much needed officers. If it were not for the fact that there are thousands of acres of rough brush-covered lands in our

state, deer would have been exterminated long before real protection came.

There have been four great steps in the protection of deer in California:

1. Protecting does.
2. Bag limit.
3. Payment of bounty on mountain lions.
4. Protection of spike bucks.

Doe killing is still allowed in many parts of the United States. Its practice will lead to extermination more quickly than anything else. There are many who claim that a barren does should be killed and say that barren does can be easily told. Perhaps they can, but for every hunter who can tell, there are 10,000 that can not.

New York State had an experience a few years ago that should be a lesson for all other deer states. In one year, under a law allowing the killing of does, more than one-third of the entire supply of deer in the state was killed.

Deer increase rapidly if undisturbed; the average normal increase is one and one-half fawns for each doe per year. John B. Burnham, of the American Game Protective Association, and one of the best informed game men in the world, says:

"For the purpose of comparison it was assumed that a breeding stock of twenty-four bucks and twenty-four does, aged two years, were available; that the increase annually thereafter was one and one-half fawns per pair * * *. Under the old law (doe killing law), assuming that 50 per cent of the deer were shot annually, extermination would result at the end of ten years. During each period 155 deer would have been killed. Under the same conditions, assuming that 50 per cent of the bucks only were killed, at the end of the ten-year period 781 bucks would have been bagged and there would have remained a breeding herd of 781 bucks and 1562 does, or a total of 2343 live deer in the woods. If 72 per cent of the bucks were killed, the hunters would have secured 1170 bucks and there would be left a breeding stock of 1952 deer."

No stronger argument can be used for the protection of does. California, with the spike buck law, goes one better. This law assures a perpetual supply of male deer; it makes no difference if all the big bucks are killed, there will remain enough bucks to carry on, and there will be an annual crop for the hunter to harvest.

The doe and spike buck law not only protects deer, but protects other hunters and live stock as well. As long as a hunter is required to be certain of the character of the deer he is shooting, and he complies with the law, nothing else will be killed. Most hunters comply with the law, but some shoot and look afterwards. As a result, each year several hunters are killed and more wounded; also, much live stock is killed, resulting in a very unpleasant relation between the stockman and deer hunters. There is a strange reluctance on the part of officers who are supposed to enforce the law to prosecute those who kill another for a deer. Only last year, in one of the valley counties, two men went after deer in closed season, one acting as dog to scare out the game; the other saw the brush move, shot and killed his companion. In this instance

there was not even a coroner's inquest. While this is an extreme instance, the writer does not know of but one case where a manslaughter charge was filed, and in that case the defendant was freed.

The greatest and most persistent natural enemy of deer is the mountain lion. In 1907, the Fish and Game Commission established a bounty of $20 for the killing of lions. Later the amount was increased to $30 for females. In the years that this bounty has been paid, 4108 lions have been killed, an average of 257 per year. The primary food of the lion, when available, is venison—buck, doe, or fawn, perhaps more frequently doe. It has been estimated by those in position to know, that a lion will kill at least one deer a week throughout his lifetime. Just how long a lion lives naturally, we do not now, but in confinement they have lived as long as sixteen years, naturally, at least ten; $4108 \times 10 \times 52$ equals 2,136,160, a vast number of deer, even though extended over a period of years. Undoubtedly more does are taken than bucks, but estimating only fifty per cent of those killed are does, think of the potential loss of fawns from over one million does.

Lions are not abundant in any part of California, but it has been estimated that there are about 600 scattered throughout the state. These kill at least 31,000 deer every year, 50 per cent does, a possible loss of 23,250 fawns each year. Knowing that lions drew heavily on the supply of deer and not being satisfied with the slow reduction of lions from the bounty system, several years ago the Commission employed an expert lion hunter, Jay Bruce. Bruce has killed about thirty-five lions per year since he was first employed. He hunts with dogs. These dogs are highly trained and will trail nothing but lions and wild cats. Dogs that chase deer are of no value to a professional lion hunter. Deer hunters regard Bruce as the most valuable employee of the Commission and insist that he be kept at work. There are other enemies of deer, the coyote and wild cat probably killing many fawns and under favorable conditions full-grown animals as well, but the lion is by far the worst enemy.

Deer are healthy animals, but every year there is a considerable loss from natural causes. There are at least fifteen parasites that deer are subject to. Some of them without doubt cause the death of thousands of deer. In 1911 a severe epidemic among deer prevailed in southern Trinity and the adjoining counties. It was estimated at least 5000 deer died in Trinity alone. This loss was probably occasioned by a bladder worm infestation. There has been no such heavy loss since, but each year in the upper coast section, many deer are found dead, probably most of them die from an over infestation of parasites, rather than disease.

It is interesting to note that epidemics are confined practicaliy altogether to the section of the state referred to. No epidemics have been reported from the Sierra, but in some years in that section there is a considerable loss on account of heavy snows. Last year many deer died in the Mount Hamilton district and a smaller number in Monterey County. It was claimed by some that this loss was from anthrax, but as to this there was no proof. It is very difficult to study the diseases of wild animals and as a result our ignorance on the subject is amazingly large. Even if we did know all about their complaints, it would be most difficult to administer a course of treatment; as a result, there always will be a considerable natural loss.

This brings us to the consideration of how many deer there are in the state and whether or not we are harvesting more deer each year than the supply will stand. Various estimates have been made as to our deer population. Most of them are based upon no definite data. Deer are unusually common in many sections. In the South Yola Bola country as many as 800 deer have been counted during winter in a single day; 125 in one glade. Jay Bruce reports that on one trip on the South Fork of the Merced River country, covering about twenty miles, he was at no time out of sight of deer and estimated that there were at least 2000 deer in a very restricted area. In many parts of the state it is not unusual to see fifty to one hundred deer per day. In the Tamalpais Game Refuge, Marin County, hikers report deer in droves. In other game refuges, where total protection has been given for a number of years, deer have increased wonderfully. As we have slightly under 3,000,000 acres of game refuges and national parks, where all hunting is prohibited, 90 per cent of which is located in excellent deer country, deer are certainly not going to be exterminated.

We have in California somewhere near 40,000,000 acres of deer country. Just how thick deer are in this vast area, no one can say, but if there is only one to each 100 acres, it would give us a deer population of 400,000. Looking at the question from a different angle, we have reason to believe that hunters kill about 20,000 deer each year and lions, about 30,000. For the sake of argument, assume that as many more die from other causes, dieases, coyotes, etc., we will have an annual loss of 100,000. If we are correct in assuming that deer are holding their own in this state, this number would represent the annual crop of fawns from the does of the state, or 66,000 does. It is reasonable to assume that there was an equal number of bucks. This would give 132,000 deer for the state, possibly much too low. The United States Forest Service estimates that there are 185,000 deer within the 19,181,500 acres of National Forest in the state, slightly less than one deer per 100 acres.

New York estimated a few years ago her deer to number about 60,000. The area of New York is approximately 30,000,000 acres or 10,000,000 less than California's deer country. Just what part of New York is deer land, we do not know, but considering the population of the state, it can not consist of more than 10,000,000 acres, or one-quarter of the deer area of California. If deer are equally numerous per square mile in this state, we should have 240,000 deer. The writer realizes that there are a great many "ifs" in this line of reasoning and does not claim that the figures are correct.

In conclusion, California is a real first-class deer state and with proper protection laws and enforcement, will remain so until the end of time.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

February 1, 1924.

"Nowadays the earth is small; the human population great. What is found on the earth must be husbanded. Recklessly waste its resources and they will disappear leaving a waste where once was abundance."

CONSISTENCY.

There is a tendency in recent years among writers in sportsmen's magazines to use the statement: "The easiest way to exterminate a species is to pass a law prohibiting all shooting." We heard this phrase often used in connection with the total protection given bob-white quail in Ohio a few years ago. To fortify this statement, such authors point out that the disappearance of the passenger pigeon was not due to the shooting of sportsmen. That the heath hen of Martha's Vineyard in Massachusetts has slowly disappeared in spite of absolute protection accorded it. We doubt whether these arguments actually sustain the phrase. To be consistent, one might expect to see the early disappearance of all insectivorous birds because they are given protection, not only in the United States but also in Canada. The swan should have long since disappeared because it is given protection in most states. The band-tailed pigeon of the western United States instead of rapidly increasing after being given protection should have totally disappeared because no toll is being taken by the hunter. There is a fallacy concerned with this oft-repeated phrase and we should like to explode it in this editorial.

To analyze the situation more fairly let us suggest that the annual reproduction of each species is more than enough to take care of the normal death rate. So long as the toll taken by the hunter does not cut into the breeding stock too severely, the species has a chance providing there are not other factors more important. Let the toll be too great and the annual increase is cut down year after year because the normal death rate usually remains the same. Of course there is an interplay of many different factors—in fact it is such a complex question that it is almost impossible to analyze it. To our mind it may very well be that in the case of the heath hen the breeding stock was cut so low that the birds have had no chance to come back, especially because there was the added important factor of reduced feeding and breeding grounds.

Slurring remarks are cast at the "gloom slingers" and perhaps it is well to cast a few similar remarks at those who would be over optimistic so that we may take the fair middle ground—that which always appears reasonable to all.

RELIEF.

When Russia is in need America sends relief expeditions; to earthquake and fire-ridden Japan provisions and supplies are furnished. The spirit of giving always comes to the fore in times of distress. However, we wonder if we overlook some of the wild creatures near at home which are hard put to it because of changed conditions. Many a flock of quail has to survive on starvation rations because of cultivated fields. Many birds become refugees and must hunt new homes because of the destruction of forests. Thousands of ducks seek new homes because their home marsh has been drained. In times of distress can we not show some of the same spirit toward lower forms of life which perhaps lack the intelligence and ingenuity of humans? Can we not study the situation near at home and see what we can do to help the bird and animal life of our immediate neighborhood? Sometimes it needs but a thought followed by a little action—the planting of some berry-bearing shrub; the furnishing of a drinking fountain and a little added food supply; the providing of hedgerows to furnish safe nesting sites; protests against ill-planned drainage of a nearby marsh. It is the thought for the wild things that will assure their continued presence with us and the resultant satisfaction of seeing actual results.

FIG. 8. A cinnamon bear of the Tahoe region. Photograph by J. H. Sanders.

IN MEMORIAM.

JAMES S. WHITE.

Deputy Fish and Game Commissioner J. S. White, late in charge of the Shasta District, was killed by John Vail at Castella, Shasta County, on October 17, 1923.

On the date of the homicide, John Vail accompanied three deputy constables in the service of a search warrant on the proprietor of the Shasta View Hotel at Castella, Shasta County. Vail at the time was not acting as a federal prohibition officer as the warrant was issued out of the justice's court at Anderson, Shasta County.

After the warrant had been served by the deputy constables, Jack Mattos, one of the proprietors, entered and discovered one Powell mutilating the hotel register and told him to stop. At this point one of Mattos' partners informed him that Powell had brought jackass liquor into the hotel and Mattos informed Powell if he did so he would throw him out. Powell left and returned in a few minutes with Vail and the three deputy constables. Vail stepped up to Mattos, who was not under arrest, nor was any search warrant directed to him, and struck Mattos on the face with his fist. He then drew a blackjack and beat Mattos on the head and face with it. At this time Mr. White entered and being a deputy sheriff and seeing Mattos' face covered with blood drew his revolver and covering the crowd inquired of Mattos as to the trouble.

One of the deputy constables told White to put up his gun and as White was in the act of doing so, Vail drew his gun and shot White twice, one bullet severing the norta and the other lodging in his spine killing him in a few seconds. While White was falling he shot Vail twice, once in the arm and once in the chest.

The killing of White was a cruel and cold-blooded murder by a man not in the discharge of his duty but in the act of committing a felony by using a blackjack, the possession of which by any person is a felony.

White was born March 23, 1863, at Troy, N. Y. Several years later his family moved to Lexington, Nebraska. At the age of 15, he left Lexington and began his career as a cowboy. He remained in this occupation continuously for twenty-three years. During that time he rode the range from the Texas border to the Canadian line but the major part of his time was spent in the states of Nebraska, Wyoming and Montana. Practically all this time he was employed by large companies as foreman. He was with the Murphy Cattle Company of Montana for a period of ten years. Here he handled immense outfits and was considered one of the most capable and reliable men of the company.

About 1903, Jim met and became a fast friend of a man who later became one of our greatest presidents, Theodore Roosevelt, who was on a ranch in Nebraska at that time. In later years, when Mr. Roosevelt was president, Mr. and Mrs. White were royally entertained by him at the White House. This act manifests in a measure the friendly spirit Mr. Roosevelt always entertained for an old friend. The writer of this has been privileged to read much of the correspondence between these two men, which White highly prized.

White moved to California in 1905 where he was employed by a company established for the apprehension of cattle thieves. He worked for the federal government for a short time and later was appointed fish and game deputy for the Shasta district and held the position until his death.

The fish and game laws were then practically unenforceable in Shasta County. A conviction was rare, but good judgment, together with his force of character and bearing, his efficient manner in dealing with the public, not only won the esteem and admiration of the residents but received their support toward the enforcement of the laws which they had previously condemned.

At the time of his death he had the support of every desirable citizen in Shasta County. It was a privilege to have him call you his friend. Jim White's creed was loyalty to his government and his superiors in the service. His sense of right and justice is shown in his correspondence as in his reports to his officers. The kindness of his heart is demonstrated by his recommendations for leniency in many deserving cases as was his resentment where, by a miscarriage of justice, a persistent violator was permitted to escape punishment.

He had the heart of a child but was as fearless as a lion in the face of danger.

Big Jim was six feet six inches of real American manhood. He believed ingratitude was the cardinal sin.

GEO. NEALE,
Executive Officer.

THE MIGRATIONS OF DUCKS.

Every duck hunter is aggressive to take part in that age-long argument as to the place where certain ducks were reared and as to the place where they go when they disappear from a pond. Too often, statements regarding the breeding and wintering places of ducks are mere guesses and have no foundation in fact.

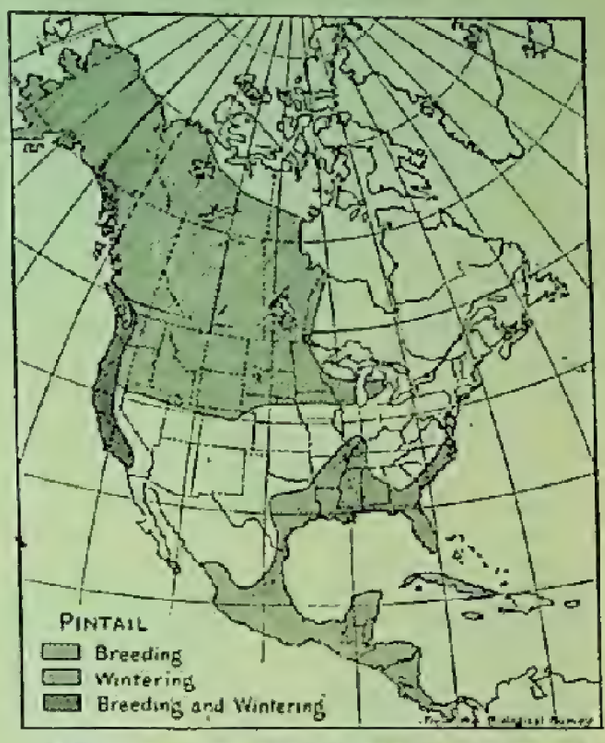
As a help to the many interested in the subject the United States Biological Survey has prepared a number of distribution maps which indicate clearly where the birds rear their young and where they spend the winter. These maps have been prepared with care, utilizing dependable data. Undoubtedly birds may occasionally breed or winter in situations not properly marked on the map, but as a whole these maps accurately show the summer and winter distribution of the birds.

Some day you will wish to refer back to these maps and we advise that you carefully file away this number of CALIFORNIA FISH AND GAME.

REFUGES NEED BETTER PATROL.

California now boasts of a fine chain of large game refuges. Effort has thus far been concentrated upon setting aside an adequate number of refuges. The time has now come when effort should be concentrated upon the improvement of the refuges established. Regulation of grazing within some of the areas is desirable. In practically all there is need of better marking and better patrol. In several instances the only thing that has made certain refuges effective was the interest of the local people living within

Where Are Your Mallards Raised?



Why Do Pintails Travel to Central America?

What Route Does the Canvasback Follow from Breeding to Wintering Grounds?

Where Do Your Canada Geese Winter?

FIG. 9. Distribution maps showing breeding and wintering places of various species of ducks and geese. Courtesy of U. S. Bureau of Biological Survey.

the refuge for the patrol has necessarily been intermittent and inadequate. Just the other day, a man reported that he had met a hunting party inside of a game refuge. One of the men announced himself as the sheriff of a neighboring county. In order to have refuges properly respected, and to accomplish the ends for which they were created, it is important that they be kept inviolate. It should be considered one of the greatest of misdemeanors to trespass inside of a refuge and adequate patrol should be maintained to deal with every violator.

ANOTHER ALBINO DEER.

Another white deer has recently been reported in Trinity County. That the albino black-tail is not as rare as some might think is evidenced by the accumulation of white skins in the Hoopa Indian Reservation. The Indians have for years been willing to pay large sums to acquire white deer in order to use the skins as ceremonial robes. Unfortunately, this has made an incentive for the destruction of these unusual animals and should the demand continue they may be expected to become still more scarce.

FISHERIES INVESTIGATIONS SUFFER.

The fisheries investigation work of the Commission appears to be a training school for government fisheries men, for several who have been mainstays have been tempted to other positions by higher salaries. Harlan B. Holmes has been in the employ of the United States Bureau of Fisheries for the past year. Elmer Higgins found he could better support his family by selling Ford automobiles, and now comes word that O. E. Sette has accepted a prominent position with the United States Bureau of Fisheries. Apparently the Fish and Game Commission is going through the same experience as that of the government in that just as soon as a man is well trained and capable of properly handling a position, he is tempted into industrial or other work by higher salaries and greater opportunities. It is evident that investigational work is greatly handicapped when an investigator leaves for another position, for all of the unrecorded knowledge acquired in years of experience is carried to the new position and the state fails to benefit by it. Nor is it an easy matter to find the right kind of scientifically trained men to fill these vacated positions. Although discouraging, those in charge are planning to carry on by acquiring the best material available to fill these positions.

FISHING CONDITIONS ON THE TRINITY RIVER.

The Trinity River has always had a splendid run of steelhead trout. In recent years, however, fishing has been much poorer because of a dam constructed each year by Indians on the Hoopa Indian Reservation. The government has continuously maintained that the state could not enforce fish and game laws on an Indian reservation. Netting and spearing of fish is practiced and the catch increased by the use of a temporary rack. The upper reaches of the river suffer accordingly.

Deputy G. O. Laws, in a recent visit to the reservation, succeeded in getting the Indians themselves to agree to take out the dam. This is an accomplishment which will assure better fishing in the river provided another menace is removed—that of dredger work. Dredges on the upper stretches of the river are now filling it with mud so that the once clear river is now muddy almost its entire length. It is to be hoped that the fishing resources will be considered along with the mining resources and that by some means the river can be restored to its original clearness.

Still another menace looms in the proposed building of a large diversion dam which would divert all the water of the river into the Sacramento Valley, leaving it practically dry from Hayfork down. This Sampson project, if put through, will effectually destroy the principal fishery resources of the river.

ONE HUNDRED AND EIGHTY-FIVE THOUSAND DEER IN CALIFORNIA FORESTS.

Not long ago we received an inquiry from a man who wished to know how many deer are to be found in the State of California. This was a difficult question to answer in that California does not require reports of the number of deer killed nor are deputies of the Commission so situated that they can obtain a dependable census.

However, articles recently published, have formed a basis for some sort of a calculation of the actual number of deer within the state. E. A. Goldman and S. B. Locke, writing in *American Forestry* for November, reckon that there are 20,000 mule deer on the 1575 square miles of the Kaibab National Forest. Yosemite National Park has 1125 square miles but doubtless this area is not as heavily populated as is the Kaibab National Forest, which has always been noted for its abundance of deer.

A still better basis of computation is to be found in a statement of the United States Department of Agriculture entitled, "Estimate Made of Big Game Animals on National Forests," released for publication on November 9, 1923, (see p. 36), to the effect that the largest herds of deer in any state are found on the National Forests in California, which shelter approximately 185,000 head.

The next question to be answered is, how many deer are found outside of the National Forests? Certainly 20,000 would not be an over large number and this would bring the total to over 200,000. With these figures as a foundation, one might speculate as to the annual increase

and compare that with the actual toll taken.

Scientific studies which will give us definite information as to the relations between annual increase, natural death rate, and the toll taken by the hunter are fundamentally essential to sane conservation. For some wild scheme to import and plant a foreign game bird or to experiment with the propagation of new fish, money is always forthcoming. But if the project be well-planned scientific studies which will take into account the actual increase of a species and thus form a basis for sane legislation, funds are difficult to obtain. Here's to the day when such needed studies are recognized and when funds are available for their prosecution!

territory and, with no natural enemies, spreads very rapidly. We wonder what the future holds when we hear that this animal destroys garden truck, climbs fruit trees and eats the fruit, breaks into rabbit hutches and chicken coops to feast upon rabbits and chickens. It is very likely that the animal that is now tolerated will be considered one of the worst of introduced pests in the future.

HUNTING ACCIDENTS.

Several years ago we decided to compile a list of the various hunting accidents in order to impress all those who go afield with the importance of following the motto: "Look before you shoot." A number of these tabulations have appeared in print and we furnish herewith accumulated records for the years 1922 and 1923. In that the mortality records kept by the State Public Health Service do not show the instances where a man is killed owing to a gun accident, the compilation is dependent upon newspaper clippings which are oftentimes inaccurate. Furthermore, it is largely by chance that these newspaper items arrive in the editor's office. The compilation, therefore, can not be vouched for as being either absolutely accurate or complete. Nevertheless, the record shows what it is intended to show—the large number of persons who annually lose their lives or are seriously injured due to their own or some other hunter's carelessness. Is it not appalling that we should have to

FIG. 10. Spawn-takers arrive at our hatcheries when they are still covered deep in snow. The photograph shows the Domingo Springs Hatchery on April 2, 1922, with the roof of the building barely exposed and snow twelve feet deep. Photograph by J. W. Ricker.

THE OPOSSUM CONTINUES TO SPREAD.

Readers who have followed the numerous items relative to the opossum in California must have been convinced that this introduced species is rapidly spreading throughout the state. A life history note on another page points out that Ventura County, which marked the northern distribution of the opossum two or three years ago, is now well populated with these animals. Within ten years the opossum has spread 100 miles or more in practically every direction from its original place of introduction. So prolific is it that seven and eight and even more young are born in a litter. Furthermore, the opossum seems to cover considerable

chronicle here the deaths of 22 men in 1922 and of 12 during 1923? In practically every instance, death would have been avoidable had those concerned taken proper precautions.

Let everyone who reads, think of the heartaches of those who have lost loved ones and ponder well over the useful lives that have been carelessly snuffed out, and then go afield determined that never because of his carelessness will his name be listed in one of these complications.

It seems that in spite of California's good laws which protect both does and spiked bucks, thus making the hunter carefully select his deer, there are many accidental deaths concerned with hunting. Several states are attempting to cope with the problem by requiring every hunter to wear some distinguishing mark on his hat. It may be that California will have to pass a similar law before the death toll can be reduced. However, it ought to be possible to so educate people that hunting accidents would be of rare occurrence.

HUNTING ACCIDENTS, 1922.

Killed.

Name	Shot by	Date	Locality	Circumstances
Aerick, Henry	----------	Oct. 12	Pine Tree Canyon, Kern County	Not known. Found in camp with bullet hole in head.
Cartensen, Henry	Christ Kelting	Nov. 24	Western Stanislaus County	Mistaken for deer. Died from loss of blood.
Cassimir, David	----------	July 31	Santa Lucia Mts., 61 mi. S.E. of Salinas	Member of San Francisco hunting party. Found dead after being missing several days. Manner unknown.
Driscoll, Eugene (17)	----------	Jan. 15	Near Arbuckle, Colusa County	Instantly killed while hunting ducks. Available accounts differ as to whether gun was accidentally discharged by victim or by companion.
Eversom, Mithoff	Unidentified hunter	Oct. 8	Topanga Canyon, Los Angeles County	Mistaken for deer.
Frietag, H.	----------	Oct. 12	Pine Tree Canyon, Kern County	Not known. Found dead in camp with Henry Aerick.
Granelli, George (11)	Self	Nov. 22	Near Martinez	Accidentally shot while hunting ducks.
Gearing, Ben	Self	Jan. 14	Near Marysville, Yuba County	Accidental discharge of gun while hunting quail. Body found January 16.
Havey, Wm. (27)	Self	Dec. 27	Biggs, Butte County	Stumbled over gun, shooting himself through back.
Herring, Alfred B. (22)	Richard Atkins	Sept. 17	30 miles N.W. of San Bernardino	Mistaken for deer.
Hester, Philip	Self	Oct. 12	Oceanside, San Diego County	Accidentally discharged gun while leaning on it waiting for ducks to come to decoys.
Hickok, Leon	----------	----------	Near Colusa, Colusa County	Accidental discharge of gun while hunting ducks.
Pratt, George A. (16)	Self	Aug. 10	Broderick, Yolo County	Killed while hunting by carrying shotgun in reckless manner.
Randall, L. B.	John Bruno	Oct. 1	Elizabeth Lake, Los Angeles County	Shooting mudhens with automatic pistol.
Rider, Charles	Self	Dec. 26	15 miles S. of Willows, Glenn County	Unknown. Found with gunshot wound in abdomen.
Smith, Mark	----------	Dec. 23	Yolo By-Pass	Drowned when boat in which he was hunting ducks overturned.
Stevenson, Jas. L. (40)	Self	Sept. 9	Near Reedley, Fresno County	Hunting doves. Gun exploded while crawling through wire fence. Shot in chest, resulting in instant death.
Stockird, Stanley	Edward Maxey	April 23	Indian Slope, near Ukiah, Mendocino Co.	Deer hunting. Moved into range of companion's gun, receiving charge intended for deer.
Vanderick, E. M.	W. F. Abralo	July 31	Near Ukiah, Mendocino County	Mistaken for a deer.
Viscaino, Fermin	Self	April 25	Redding, Shasta County	Jumped from three-foot porch with gun in hand to fire at passing geese. Concussion exploded shell. Instant death resulted from shot in breast.
Wheaton, Nicholas C.	Unidentified hunter	Sept. 4	Clover Meadows, Fresno County	Mistaken for deer.
Zimmerman, Wm.	Walter Hensley	Jan. 14	Dodgeland, near Chico, Butte County	Hunting ducks in tules. Stepped in front of companion's gun just as he fired. Lungs punctured. Death occurred few hours later.

Wounded.

Name	Shot by	Date	Locality	Circumstances
Gilzean, Chas.	Jerry Howard	Jan. 15	Redding, Shasta County	Mistaken for game in brush while hunting quail. Received 17 buckshot in face and chest.
Haswell, James		Oct. 1	Near Los Angeles	Shot in eye.
Schiemer, Joe	Companion	Aug. 2	Near Princeton	Shot in the arm while hunting deer.
Skedd, George (21)	Self	Oct. 25	Plumas Lake	Dropped gun, shooting self in leg.
Thompson, L. M.	Self	Nov. 9	Salton Sea	Discharged gun when changing position in boat, shooting self in arm.

HUNTING ACCIDENTS, 1923.

Killed.

Barnett, J. J.	Companion	Aug.	Straw, Modoc County	Mistaken for deer.
Dell, Robert (16)	Marion Elwell	Nov. 12	El Cajon Valley, San Diego County	While hunting quail.
Devan, W. E.	Unknown hunter	Oct. 10	Near Quincy, Plumas County	Not known. Found dead.
Devenney, Anthony A.	Self(?)	Sept. 26	Grass Valley, Nevada County	"Gun accident."
Gomez, Albert (18)	Hunting companion	Oct. 15	Cordelia, Solano County	Jumped up in front of companion's gun when hunting ducks in blind.
Howes, F. S.	Self	Jan. 5	Dulzura, San Diego County	Shotgun accidentally discharged while crawling through wire fence.
Jones, Edward	Robert Lewis	Sept. 2	14 miles east of Placerville	Mistaken for a deer.
Klann, Max G. (37)	Self	July 30	Kelseyville, Lake County	Rifle accidentally discharged while crawling through wire fence.
Murphy, Rollo G. (38)	Roy Martz	Aug. 19	Cobb Mountain, Lake County	Bullet intended for wounded buck glanced and hit victim.
Reithe, R. L. (32)	Self	Oct. 16	Sacramento	After cleaning rifle placed it on bed. As it fell to floor, was discharged, bullet entering neck.
Sparks, R. A.	Self	Oct. 8	Dixon, Yolo County	Accidental discharge of gun while hunting hawks.
Woodworth, Carl (16)	Self	Sept. 21	Napa, Napa County	Accidental discharge of gun while hunting doves.

Wounded.

Chadbourne, B. F.	John McBroom	Sept. 4	Cecilville, Siskiyou County	Mistaken for deer. Severely wounded.
Griffith, Arthur (10)	Earl Cavanaugh(20)	Nov.	Blue Lake, Humboldt County	Accidentally shot in hand.
Hogue, Wayne E.	Harry Boyd	Sept. 5	Southern Humboldt County	Mistaken for deer. Shot in legs.
Keating, Harold (15)	Alfred Olsen	May 30	Redwood Canyon, Oakland	Accidental discharge of gun. Shot in left leg.
Laffranchini, L.	Self	Dec. 21	Hayfork, Trinity County	Fell over log, receiving rifle bullet in shoulder.
Maher, Will	Self	Aug. 12	Healdsburg	Accidental discharge of gun while cleaning it. Shot in right foot.
Makiney, Peter	Self	Oct. 30	Woodland, Yolo County	Shot in head when gun was accidentally discharged.
McKenzie, Roy (11)	Lludner Wiegart	Dec. 2	Anderson, Shasta County	Shot in thigh with "unloaded" gun.
Messich, Perry	Self	Dec. 6	Macdoel, Siskiyou County	Accidental discharge of shotgun while hunting.
Thomason, John W.	Unknown hunter	Oct. 24	Grass Valley	Struck between eyes by spent bullet.
Weston, Clarence	James Levaggi	Nov. 12	Plymouth, Amador County	Received full charge of shot directed at quail, by his friend, who failed to see him.

THE GROWTH OF FISH.

More and more we are able to determine the age and rate of growth of fish. The most dependable information, of course, comes from marking experiments and microscopic examination of scales, but some idea as to the rate of growth may be obtained through knowledge of the time when certain barren lakes were planted with fish. The accompanying photograph shows Loch Leven trout from Upper Lake of Cañon Creek in Trinity County, caught by E. V. Roland and J. L. Ackerman in August, 1923. The largest of these fish was 22 inches in length, and the others 11 to 14 inches. This lake was planted by J. L. Ackerman and J. C. Green in 1914. If the largest one of these fish was one of the original planting, it must have attained its size within nine years.

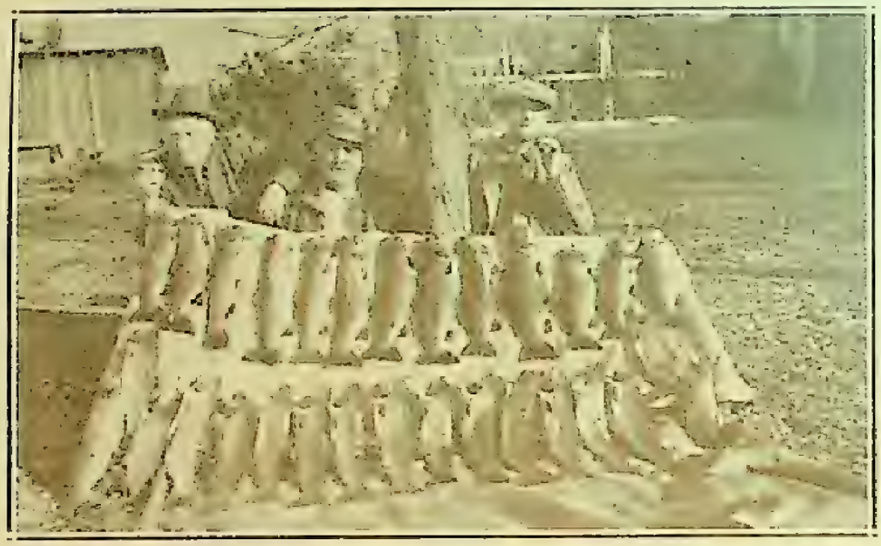


FIG. 11. A catch of Klamath trout, 1922. The Klamath furnishes the best sport to be found on any stream in the state. Many travel across the continent to enjoy fishing here. Photograph by George Neale.

BIRDS AND HIGH VOLTAGE WIRES.

Many persons have watched great flocks of birds as they perch on high voltage wires, apparently not inconvenienced by the current. Of course the explanation is that the birds as a rule do not cause a short circuit.

That some birds and animals are electrocuted as are linemen, is revealed in a report of the Pacific Gas and Electric Company to be found in the Pacific Service Magazine. Here it is stated that during 1922, thirty severe electric disturbances in high voltage current were caused by birds and mammals. Hawks, which attempt to perch close to a pole, often cause a short circuit with their long wings, with dire results. Wild cats and house cats occasionally climb poles and when the trouble man investigates he finds electrocuted cats.

TRINITY COUNTY OFFICIALS SUPPORT FISH PLANTING.

Trinity County has become so interested in her natural resources that the county government now handles all of the fish planted. Quad trucks, owned by the county, which carry about twenty-five fish cans, are utilized. The county pays for all of the work and the deputies of the commission supervise it.

"PUBLIC FUNDS AND SPORT."

Under the above caption, there appeared in the editorial column of the *New Jersey Outdoorsman*, December, 1922, the following article which we quote verbatim because it applies equally well to California so far as the source of funds used for fish and game regulation and salaries of fish and game commissioners is concerned:

"Of late *The Trenton Times* has been conducting an editorial campaign against hunting in this state. In one of its flings at the sport it has this to say:

" 'There is also practical argument to be advanced against the spending of public funds to provide for a few private individuals a heartless pastime which may work serious harm to others.'

"We can forget the 'heartless pastime' because that, after all, is a matter of individual opinion, but it is too bad that the *Times* should spread that old stuff about 'public funds,' giving the

impression that money contributed by the taxpayers is being used to further sport in this state.

"There has been so much said, in the press and elsewhere, in the last few years about the funds of the State Fish and Game Commission that it is hard to believe it possible to find anybody who does not know that the only public funds used for the propagation and protection of fish and game in this state are those received direct from the department in the shape of license fees, fines, etc., yet here is a newspaper falling into error on the subject.

"The misapprehension as to the fish and game funds is like that other one about the 'fat salaries' paid members of the Fish and Game Commission. That is one state board whose members give their time and their energies without hope of financial reward."

ALIEN VIOLATORS FINED FOR NETTING SONG BIRDS.

A costly lesson was again administered by the law enforcement arm of the Fish and Game Commission last October, this time to four Italians caught capturing song birds in the silken nets so common in Italy and which, in that country, have been responsible for wholesale destruction of bird life. The four men were arrested by Deputy Jack Burke of Colma, and five nets and 133 illegally taken birds were confiscated. The offenders were tried before Judge Ellis C. Johnson at Daly City, Mr. J. S. Hunter, Assistant Executive Officer of the Fish and Game Commission, appearing as prosecuting attorney. E. L. Bagattai, who claimed ownership of all the nets, was fined $200; G. Fissolo, the owner of the automobile transporting the crowd, was fined $100; H. Caprin, found to be almost equally interested, was fined $100, and G. Santi, but recently arrived in this country, was fined $50, making a total fine of $450—an average of nearly $3.50 per bird.

The nets so used are of a very delicate silken thread and form a hopeless snare to the bird that becomes entangled in their meshes. Aliens—Italians in particular—are the chief violators in this respect as in Italy it is common to use for food, and until recently not unlawful to take in this manner, even the smallest song birds.

All of the confiscated birds were identified at the California Museum of Vertebrate Zoology, Berkeley, most as song and insectivorous birds belonging to the classes protected by the Federal Migratory Bird Treaty Act. The list comprised wrens, warblers, bush-tits, and various beneficial, native sparrows, the greater number being the permanently resident white-crowned and song sparrows. The last two named are among the best known and best loved of California birds. Both are delightful singers, their songs being cheery, melodious and pleasing. The white-crowned is a persistent songster, singing even at night. All are birds that do very little, if any, damage and may be considered of benefit to agriculture as there are no fruit eaters among them and all are species that feed either upon insects, or, partly upon insects and partly upon seeds. At any rate, their aesthetic value is very much worth the effort of protecting them.

These birds were taken on some ground near a cemetery, a place where birds are usually numerous for the reason that, in California, cemeteries are virtually bird sanctuaries. It is a punishable misdemeanor to kill or injure birds or to destroy their nests or eggs in any public cemetery in this state. A census of birds in the bay region shows an average of ten birds per acre all through the suburban districts. This little netting expedition, therefore, destroyed the equal of all the birds on thirteen acres of land.

Earlier in the year, Deputy Burke assisted in the arrest of three Italians, residents of San Francisco, for a similar offense. Each violator, in that case, was fined $100. The need of additional educational measures to go hand in hand with law enforcement becomes more and more apparent.

AN ANTI-POLLUTION LEAGUE.

Following the custom of attempting to accomplish an end by means of an organization, the National Coast Anti-Pollution League has been organized. Its object is to secure and aid in the enactment of adequate laws to prevent pollution of navigable coastal and inland waters; and also to obtain the cooperation of the ship owners, manufacturers and others responsible for such pollution.

The officers and executive committee of the league are composed of a large group of public officials who are peculiarly qualified to devise ways and means of curbing the spread of the pollution evil. Among them are commissioners of health, of harbors, or state conservation, of state fisheries, mayors and other eminently able men acting from the highest civic motives.

The league is backing the passage of the Freylinghuysen bill which failed of passage during the last session of congress. This bill provides, among other things, a penalty of not more than $2,500, or imprisonment for one year, or both,

for any person who permits oil to flow from a boat into navigable waters. Provision is also made for a board of local inspectors empowered to revoke the license of any vessel found guilty of violation of the act. To safeguard possible infraction, the law will prohibit the transfer of oil to and from a vessel after dark and harbor officials must be notified at least three hours before a ship may take on or discharge oil.

INTENSIVE STUDIES NEEDED.

At the Sixteenth Convention of the International Association of Game, Fish and Conservation Commissioners, held at Madison, Wisconsin, September, 1923, Mr. J. B. Harkin, Commissioner of Canadian National Parks, gave an address on "Federal Game Activities in Canada." A paragraph contained therein supports the contention often published in these pages relative to the need for better knowledge of the life and habits of the animals which we are attempting to conserve. Here is the paragraph—read it:

"Another thought that has come to us in our work is the need of more intensive study of the field habits of animals. Although your biological survey and our men have been working for years we have not even scratched the surface of knowledge in respect to wild life. I do not think we can ever legislate or administer laws and regulations intelligently unless we get a much better knowledge of the habits of wild life."

GULLS AND MERGANSERS DESTROY SALMON EGGS.

Some interesting studies have been carried on by J. A. Munro relative to the relation of various ducks and gulls to the propagation of sockeye salmon at Henderson Lake, Vancouver Island, British Columbia. The results of these investigations, published in the *Canadian Field Naturalist*, Volume XXXVII, show that gulls and mergansers are destructive to the eggs of sockeye salmon. Glaucous-winged gulls were found to feed largely upon dead salmon. Sometimes they were to be seen feeding in the spawning beds, burying their bills in the loose gravel and picking out the eggs among the spawning fish. Short-billed gulls fed in much the same way except that they often dove where the water was too deep for their short legs. The American merganser, by adaptation and food preference, seemed to cause most destruction. No remains of young salmon or fish of any other species were found in the specimens first examined. On the other hand, all of the thirteen stomachs examined contained salmon eggs. That salmon fry are sometimes eaten was proved by stomachs secured later which contained small salmon fry.

The author concludes with this interesting statement:

"In so far as the Henderson Lake area is concerned it might be pointed out that in 1922 the sockeye run was much larger than in any preceding year to 1911 at least. The number of spawning fish was estimated by the hatchery superintendent to be 150,000 and as the spawning ground was overcrowded it is obvious that a greater number of fish could not seed the beds to better advantage. I should judge, therefore, that in spite of the admitted destruction of eggs by birds enough fry are hatched in that region to ensure at least a normal salmon run."

MIGRATORY GAME BIRDS HAVE MANY NAMES.

Most hunters are continually discovering new local names for various species but few people realize the extent to which such local names are used the country over. W. L. McAtee, of the United States Bureau of Biological Survey has just published a Miscellaneous Circular, No. 13, entitled, "Local Names of Migratory Game Birds," in which will be found a full index of such names for each species. It describes the breeding ranges, migration paths, and winter homes. Then follows two lists of names—those which are or have been in actual vernacular use and second, book names. Most of the species are figured.

To show the extent to which local names are utilized, it may be pointed out that 16 names are known for the surf scoter in Maine; 92 distinct names for the ruddy duck in the United States and Canada; and 14 names for the golden plover in one state—namely, Massachusetts. An index lists more than 5000 names of migratory birds.

ESTIMATE MADE OF BIG GAME ANIMALS ON NATIONAL FORESTS.

Nearly 441,000 head of deer make their home on the national forests according to a rough estimate of big game animals recently completed by forestry officials of the United States Department of Agriculture. The largest herds of deer are found on the national forests in California, which shelter approximately 185,000 head.

Oregon is next to California, with a total of 57,000, its largest herd being on the Santiam National Forest. Montana ranks third, with a total of 41,000 head,

the largest single herd of which grazes on the Jefferson National Forest. Idaho is fourth, with a total of nearly 30,000.

Arizona Ranks Sixth.

Sixth on the list is Arizona with about 24,000 head of deer, 20,000 of which graze on the Kaibab National Forest alone. This forest contains the Grand Canyon National Game Preserve, where hunting is not allowed. The herd on the Kaibab Forest has often been erroneously described as the "largest herd of deer in the world." As a matter of fact the Kaibab herd is greatly exceeded by the herds on the Trinity and California National Forests in California.

The number of elk grazing on the national forests is placed at 40,500, according to the big game estimate. The Teton National Forest in Wyoming, bordering the Yellowstone National Park on the south, contains a larger number of elk than any other national forest, although several other, notably the Olympic Forest in Washington, have herds ranging from 3000 to 7000 head.

On all national forests hunting is allowed in the open season except on areas established as Federal or State game refuges.

Elk Herds Increase.

During the last three years the winter losses of elk in the national forests surrounding the Yellowstone Park have been negligible. The increase in the herds has been high, and two or three years more of mild winters and good summers may bring another danger point with a die-off in a hard winter such as was experienced in 1919-20.

Forest Service officials point out that a permanent increase in the elk of the Northwest, especially around the Yellowstone, is largely a matter of available winter range, which is extremely limited, the greater portion of the old winter ranges having been taken up by settlers for homesteads.

The recent big game census also shows increases during the past few years in several plants of elk made on various national forests. The plant made about ten years ago on the Sitgreaves Forest in Arizona, consisting of about 65 head, now numbers over 350 head, and it is possible that the State Game Warden may permit hunting of elk in the near future in order to check too rapid growth.

Antelope Herds Scarce.

The antelope, or pronghorn, are still in a very unsatisfactory situation, forestry officials say. The census shows a few antelope in many national forests, but nowhere are they increasing. In northwestern Nevada and southeastern Oregon there is a large antelope herd, estimated at from 1500 to 3000 head, grazing on public lands outside of forest areas. An effort is now being made to secure the creation of a game refuge which will cover the habitat of this herd so that it may be protected and saved from extermination.

The number of moose on the national forests has been increasing in recent years. The largest number is found on the Teton National Forest in northern Wyoming where moose are now becoming rather plentiful.

In addition to deer, elk, and antelope, the estimate lists 149 buffaloes on National forests, 67 caribou, 10,500 mountain goats, and 12,300 mountain sheep.

The buffaloes are mainly on the Wichita National Forest and Game Preserve in Oklahoma. Forty buffaloes, representing the increase of this herd beyond the carrying capacity of its range, have been given to city parks and zoological gardens during the last 4 years. One buffalo was presented to the Republic of Mexico and one to Montevideo, capital of Uruguay.

The estimate as a whole indicates that except for the antelope there has been a slight increase in the number of most big game animals on the national forests. The census was conservative, and an underestimate is regarded as more likely than an overestimate

Grazing Permits Curtailed.

The Department of Agriculture calls attention to the fact that wherever it has been necessary to protect big game animals, especially deer and elk, from competition with cattle and sheep for forage, the Forest Service has curtailed grazing permits for domestic livestock. Heavy reductions have been made on the Kaibab National Forest in Arizona in order to make more forage available for the rapidly-increasing deer herd. About 90 per cent of the cattle and all sheep have been withdrawn from certain areas in the National Forests in the Yellowstone region in favor of the elk grazing in and near the Yellowstone Park. The areas thus closed to grazing in that region amount to over 1,500,000 acres of excellent range.

As a rule, except on the Kaibab National Forest in Arizona, the big game animals have at this time a sufficient amount of summer forage for their needs, but there is a general shortage of winter range. On the Kaibab even the summer

range is already overstocked with deer and the inevitable further increases in this deer herd makes losses almost certain should a combination of a dry summer and a severe winter occur—not an unusual condition in northern Arizona.

CALIFORNIA LEADS UNITED STATES IN FOREST FIRES.

San Francisco: "The worst forest fire State in the Union." This in brief is California's National Forest fire record for 1923, according to report of the U. S. Forest Service headquarters in this city, just made public.

More fires were started in the National Forests of the Golden State this season than during any year since 1917. Out of the total of 1367 fires that occurred, nearly 50 per cent resulted from lightning; the remainder being due to human carelessness, and were, therefore, preventable. Of the man-caused fires, tobacco smokers started 358 or 50 per cent, and campers 117 or 16 per cent. Railroads, brush-burners, lumbering and incendiarism accounted for the rest.

The total area burned over by fires within the National Forests was 173,257 acres, of which 145,437 acres were Government land, and 26,820 acres private holdings. The Forest Service spent more than $100,000 in extinguishing these conflagrations.

In the Angeles, Santa Barbara and Cleveland National Forests of southern California there were 191 fires which destroyed the tree and brush growth on 127,430 acres. All but 10,000 acres of this total resulted largely from two big fires in the Santa Barbara National Forest; the other southern forests experiencing an extremely favorable fire season.

In northern California the Plumas National Forest with 224 fires holds first place, followed by the Shasta Forest with 154 fires, Lassen Forest, 127 fires, and the Klamath Forest with 103 fires. The Trinity Forest had 26 incendiary fires, and the Plumas 16; the total of fires on all National Forests due to incendiarism numbering 76. The greatest damage by fire in the northern part of the state occurred on the California Forest where 20,643 acres were swept by flames. The Mono National Forest, on the east slope of the Sierras, had only 6 fires which burned over 33 acres.

Eighty-six per cent of all fires that started in the National Forests were extinguished by forest rangers and cooperators before they had covered an area of more than 10 acres each. Forest officers also handled 152 law enforcement cases against violators of the state and federal fire laws, and have secured convictions, to date, in 120 cases.

"There is little for Californians to be proud of in this record," said District Forester Paul G. Redington. "While there has been a slight decrease in the total number of man-caused fires in the National Forests, there has also been a startling increase in the conflagrations directly chargeable to users of tobacco. The 'tailormade' cigarette and the unextinguished match still continue to be the greatest enemies of our magnificent forests. It is surprising, also, to note the number of fires started by careless campers, especially in view of the intensive educational campaign that has been waged these many years by the Forest Service, State Forester and other agencies throughout the State.

"Uncle Sam is a long suffering individual," continued the District Forester, "but there is no question that unless there is a marked change, as regards fires, in the attitude and actions of the public that use the national forests as a summer vacation land, we shall be obliged to periodically close certain popular recreation forests, where there is a big fire hazard, to all forms of picnic and camp fires. In other localities we may have to place a ban on smoking in the woods, and require visitors who desire to build fires to use only designated camping and picnic grounds. The Forest Service now requires that everyone who intends to build a fire in a national forest secure a camp-fire permit, on the back of which are specific rules in regard to the use of fire in the woods. But even this system does not give us complete immunity against conflagrations started by careless campers.

"The Forest Service would regret exceedingly," said Mr. Redington, "to have to issue orders restricting the public use of our national forests which cover the greater part of the mountain regions of the state and constitute a most popular playground. But if such action is taken, the public will only have itself to blame. One thing is certain—we have got to reduce the number of man-caused fires, and if educational methods fail to produce the desired results the government is prepared to take more stringent measures. I am confident, however, that with an awakening public sentiment in regard to the needless destruction caused by forest fires, and the unqualified support of the press, educational institutions, commercial organizations, women's clubs and citizens of the state, we shall be able to successfully solve the fire problem which is so vital to the prosperity and well being of California."

WHAT ARE NATIONAL FORESTS AND NATIONAL PARKS?

Dear Mr. Editor:

Much confusion and misunderstanding exists in the public mind as to the essential differences between national forests and national parks. It is hoped that the following facts will help anyone to understand clearly the common accepted standards for the establishment and administration of these public areas:

There are seventeen national forests in California with a net area of over 19,000,000 acres. The national parks of the state are four in number and include an area of approximately 1,000,000 acres.

The national forests are administered by the Forest Service of the U. S Department of Agriculture; while the national parks are under the jurisdiction of the National Park Service of the Department of the Interior.

The purpose of the national forests is to protect and maintain, in a permanent productive and useful condition, lands unsuited to agriculture, but capable of yielding timber or other general benefits, such as forage for livestock; water for irrigation, domestic use and power, and playgrounds for our citizens. All the resources of the national forests are developed to the greatest possible extent consistent with permanent productivity under the principle of coordinated use. *The principle of use of resources is the vital distinction between national forests and national parks.*

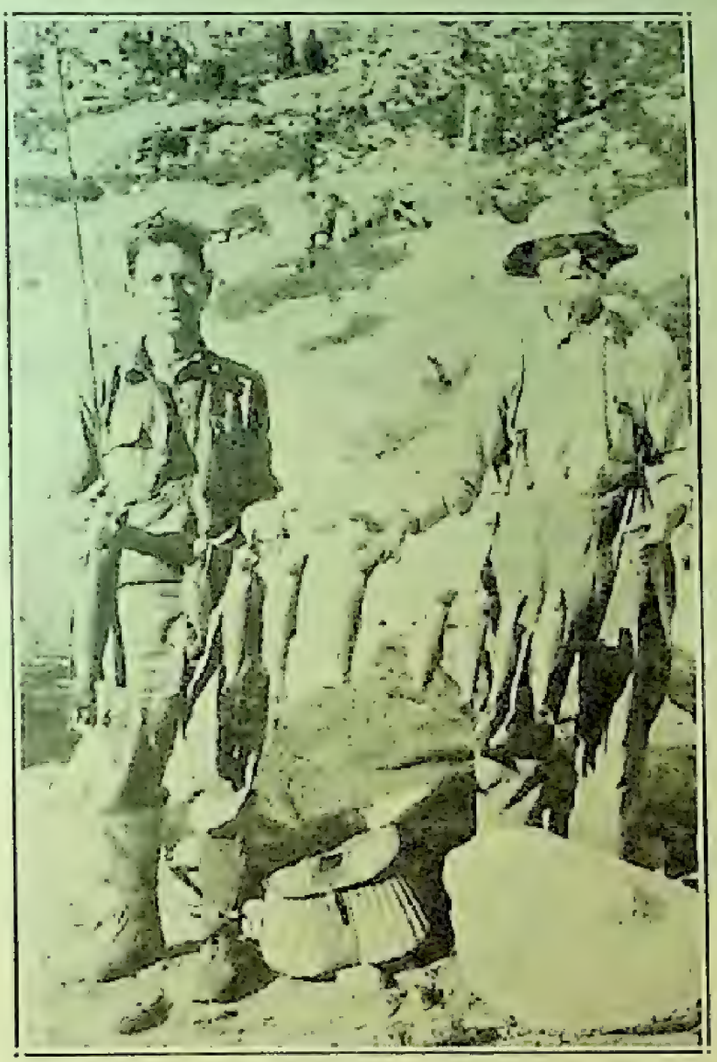


FIG. 12. A catch of Loch Leven trout from Upper Lake of Canyon Creek. Originally planted in 1914, the lake now furnishes fish from 11 to 22 inches in length. Photograph by Mrs. Bessie Beatty Roland.

The purpose in creating national parks is to preserve the scenery, the natural and historic objects, and the plants and wild life. The objects are the enjoyment of the people and the aiding of educa-

tion and scientific study by keeping such areas unimpaired. National parks are protected completely from any and all militarian and commercial enterprises save those necessary for and subservient to legitimate park uses.

Many head-writers still confuse the national forests with parks; others call them "forest reserves," although congress many years ago officially changed the name of these federal areas to national forests. I am sure that everyone at all familiar with the use that is being made of national forest resources for the benefit of our citizens and the upbuilding of California will appreciate the inappropriateness of the old term "reserve."—Paul G. Redington, District Forester.

THREE FINED ON TRESPASSING CHARGE.

That the law designed to protect the man who wishes to make his own ranch a game refuge is workable, is evidenced by the fact that during September three men in Napa County pleaded guilty and were fined $15 for trespassing upon properly posted land while hunting deer. It will be remembered that the law provides that where signs are displayed, not less than three to the mile along the exterior boundaries of premises, forbidding shooting and hunting, the trespass law is made enforceable.

WILD BIRDS PROTECTION BILL.

England has for some time been planning consolidation and emendation of the bird protection laws. A measure embodying many changes was introduced in the House of Lords on June 28, 1923, by Viscount Grey and passed with a few alterations on June 30. It is expected that the bill will be introduced and passed by the House of Commons during the autumn session. The committee was appointed by the Home Office in 1913, to study the matter but owing to the war the committee's report was not made until 1919. Attempts thus far to have a suitable measure passed have failed.

Among the new features of this bill are the following:

"A Wild Birds Advisory Committee is to be appointed by the Secretary of State to advise with regard to the administration of the law and as to projected schemes for the protection of wild birds, at home or internationally.

"The better protection of rare birds from private collectors is aimed at by a clause requiring taxidermists, and dealers in birds' eggs, to keep a register of scheduled birds and eggs brought to them, 'with details of the locality from which they came and of the person from whom they were procured,' such register to be open to the police.

"The police are to have the right to stop and search persons reasonably suspected of committing an offense; also to enter upon land or premises where there is reasonable cause to suspect certain offenses are committed.

"Onus of proof is more fully thrown on the possessor of bird or egg where illegal taking is suspected.

"Licenses may be granted to kill or take birds or nests and eggs 'for any scientific purpose, or for the purpose of the protection of property, crops or fisheries, or for any other special purpose approved by the Secretary of State.' Obviously this clause will require very careful watching, and needs to be more clearly expressed and more strongly hedged about.

"The use of mechanically-propelled boats and aircraft, and of bird-lime and braced or maimed decoy-birds, for killing or taking wild birds, is prohibited.

"The sale of Lapwings for food in close-time, and the taking of their eggs, except by owner or occupier of the land before April 15th, is prohibited.

"The suppression of birdcatching on highways and commons is a concession to that public opinion which one trade can not expect to defy forever.

"The suggestion of a license for catchers is a more debatable matter. Presumably the idea is to place names and addresses in the possession of the authorities and weed out a certain number of back-yard 'aviaries'; but the proposed payment is only 5s for a first and 1s for subsequent annual payments, and it is hard to imagine that any benefit can accrue to set against the grave objection to 'licensed' birdcatchers.

"The liberation of imported birds of any species is prohibited except by leave of the Secretary of State. (Probably birds other than British birds is intended.)"

WILD LIFE CONSERVATION IN EUROPE.

Dr. T. Gilbert Pearson, who returned recently from a lecturing and organizing tour through seven of the countries in Europe, has given out the following statement relative to conservation in Europe:

Europe is looking to America for leadership in some of the lines of endeavor in which we as a nation have specialized. There is no country in the

world that is so thoroughly organized and has such advanced laws for bird protection as the United States, and many of our methods can be and doubtless will be adapted to meet European conditions.

Through southern Europe especially very little attention is paid to bird protection. This may be illustrated by the fact that in all France in the year 1921 there were only sixty convictions for violation of the bird laws. During the same period in New York State alone there were more than one thousand. In Hungary I was told that during the past year with all of the thousands of bird killers in the country not one had been prosecuted. In Italy I saw nets, traps and various cages used to catch small song birds for food. There is a vast traffic in the bodies of these little songsters in that country. In Rome I saw in cages small birds whose eyes had been blinded by red hot irons on the theory that in their darkness they would sing better and thus prove more effective decoys in alluring other feathered friends to destruction.

Our International organization is now in effective operation in the United States, Canada, Australia, Norway, England, Holland, Luxemburg, France and Italy. Other countries have recently been invited to unite with the movement, and action by them may be expected soon. Members of the committee in the different countries are formed into national sections which deal especially with bird protective problems distinctly national in their scope.

Everywhere I went in Europe our plan was received most cordially.

COLORED PICTURES OF CALIFORNIA BIRDS OBTAINABLE.

The California Audubon Society announces that it is cooperating with the National Association of Audubon Societies in the distribution of a set of Junior Audubon leaflets which are now available for the work. These leaflets are: Varied Thrush and Lewis' Woodpecker, by Wm. L. Finley of Portland, Oregon; House Finch and Black Phoebe, by Carrol De Wilton Scott of San Diego; Western Meadowlark, by Harriet Williams Myers, and Anthony's Towhee, by Mary Mann Miller, both of Los Angeles. All have pictures of the birds in colors, painted by Major Allan Brooks.

This set may be obtained by Junior Audubon members and teachers forming Junior groups for ten cents for the six. Bird buttons will be given to the Juniors and where a group of not less than twenty-five is formed the National Association will send the magazine, Bird Lore, to the leader. The regular subscription to this magazine is $1.50. Adults wishing the leaflets may have them for five cents apiece. Order this set from Wilfred Smith, President, Altadena, California.

Besides these six new leaflets the National Association has published the following ones which are useful to western bird students and may be obtained (at five cents each) direct from the National Association of Audubon Societies, 1974 Broadway, New York. Order by number.

Written for the West.

40. Bush-tit.
91. Sage Grouse.
58. California Quail.
45. Blackheaded Grosbeak.
64. Emperor Goose.
69. Tufted Puffin.

Written for the Whole Country, Including the West.

2. Mourning Dove.
31. Song Sparrow.
53. Horned Lark.
32. Barn Swallow.
16. Tree Sparrow.
33. Tree Swallow.
35. Crossbills.
95. Raven.
28. Purple Finch.
1. Nighthawk.
63. Ruffled Grouse.
10. Sparrow Hawk.
82. Bald Eagle.
23. Killdeer.
66. Green Heron.
75. Sora Rail.
88. Avocet.
94. Pileated Woodpecker.
15. Yellow-billed Cuckoo.
12. Short-eared Owl.
97. Least Tern.
78. Loon.
29. Herring Gull.
83. Surf Scoter.
36. Mallard.
76. Pin-tailed Duck.
84. Shoveller.
65. Crested Auklet.
14. Barn Owl.
90. English Sparrow.
19. Belted Kingfisher.
6. Passenger Pigeon.
51. Spotted Sandpiper.
62. Hudsonian Curlew.
89. Black-necked Stilt.
100. Turkey Vulture.

SHOOTING MIGRATORY WILD FOWL NOT LAWFUL AFTER SUNSET.

Hunting migratory game birds is permitted under federal regulations each

day during the open season from half an hour before sunrise to sunset. Persons found hunting between sunset and half an hour before sunrise are liable to prosecution in federal court under the provisions of Regulation 4 of the migratory-bird treaty-act regulations. A state law recently passed by the legislature of South Dakota provides that waterfowl may be shot half an hour after sunset. The Biological Survey of the United States Department of Agriculture points out that state legislatures may pass laws to give further protection to migratory birds, if such laws or regulations do not extend the open seasons for such birds beyond the times prescribed by the migratory-bird treaty-act regulations. Although the state law permits shooting from sunrise to half an hour after sunset, a person so doing may be arrested and prosecuted under the federal law, administered by the Department of Agriculture.

WHO BANDED THESE DUCKS?

The Biological Survey of the United States Department of Agriculture is trying to learn where two ducks were tagged with aluminum bands of a kind different from those used in the bureau's investigations. Both bands are of the kind known as "challenge" bands, and both had the number "13" in raised figures.

One was carried by a hen mallard shot on Bear Lake, Minn., on October 20, 1923, by Dr. George A. Dodge, and was reported to the bureau by Chas. W. Henke, Assistant Commissioner of the Department of Game and Fish of Minnesota. The other band was carried by a drake mallard, killed ten days later by G. A. Simon, at Horse Shoe Lake, seven miles northeast of St. Louis, Mo.

Strange bands are frequently sent to the Biological Survey by sportsmen and others who know about the bird banding investigations being carried on by the bureau to trace more definitely the migrations of our wild fowl. While these two strange bands were recovered about 370 miles apart, it is probable that they were attached at the same point in the Mississippi Valley flyway. From the fact that the bands were similar it is hoped by the bureau that information may be forthcoming as to their origin. Anyone knowing about the matter will be aiding in an important field of scientific investigations if he will communicate with the Biological Survey and supply information as to when, where, and by whom the bands were attached.

ALASKA SEALS ARRIVE FOR STEINHART AQUARIUM.

The Government Revenue Cutter Manzanita recently brought a shipment of live Alaska Fur Seals for the seal pools in front of the new Steinhart Aquarium in Golden Gate Park. These animals now form a special attraction to that already much talked of exhibit.

The protection and care of the herd from which these animals were secured is a splendid example of animal conservation which goes to prove that many of our wild creatures with a little care and judgment can be again brought back to their former abundance.

Alaska was purchased from the Russians in 1867, at a cost of $7,200,000. The Pribilof Islands were leased to the Alaska Commercial Company for twenty years, 1870 to 1890, and this company was allowed to take and did take 100,000 fur seal skins annually.

The next contract was with the Northern Commercial Company for another twenty years, 1890 to 1910. Their catch was limited to 40,000 skins annually but never reached that amount. Their contract was practically ruined by pelagic—that is, open sea—hunting, which started shortly after 1890 and the entire herd was nearly exterminated. Males, females and young were killed, so that the catch on the islands in 1893 was only 7390 skins, though the contract allowed 40,000 to be taken.

Pelagic sealing was stopped about 1911 by the Treaty of August 24, 1912, the herd then being reduced to 127,000 seals from over three million in 1873. All killing was discontinued from 1912 to 1918.

The United States Department of Commerce (Bureau of Fisheries) in 1903 took over the management of the islands from the Treasury Department and has handled them ever since.

The Herd Census on St. George and St. Paul, the two islands of the Pribilof, is as follows:

	Seals		*Seals*
1867	5,000,000	1916	417,000
1873	3,200,000	1917	469,000
1905	200,000	1918	496,000
1911	127,000	1919	524,000
1912	216,000	1920	553,000
1913	268,000	1921	581,000
1914	294,000	1922	604,000
1915	364,000	1923	625,000

In 1918 the Government resumed taking the three, four and five year old bachelor seals. The catch of 1918-19 and 1920 comprised 30,958 seal skins which were sold in St. Louis at auction in 1921, bringing $1,049,176. The highest price was sixty-one dollars per skin for a choice

lot of sixty skins. The average for all was thirty-five dollars per skin. The skins are always sold in different graded parcels.

The catch for the last few years on the Pribilof Islands is as follows:

1921_____ 23,681 skins were taken
1922_____ 30,260 skins were taken
1923_____ 11,000 skins were taken

The Fouke Fur Company of St. Louis are the United States Government agents and handle all sales.

The California Academy of Sciences has a fine habitat group of Alaska Fur Seals, also an exhibit showing seal skins in the raw and finished state.

—M. Hall McAllister.

San Francisco, October 8, 1923.

NOT ALL BANDED BIRDS COME FROM WASHINGTON.

A bird bearing on its leg a band numbered 231048 on one side, and stamped "Washington, D. C." on the other, was shot 30 miles west of Edmonton, Alberta, Canada, on September 15, and the matter written up in an Edmonton paper under the heading "Washington Duck Shot in Alberta." That the bird was banded in Illinois instead of Washington, D. C., however, was learned from the Biological Survey of the United States Department of Agriculture. When the files of that bureau were consulted they showed that the bird so numbered was a mallard duck and that it had been banded by an assistant of the Biological Survey at the Sanganois Gun Club, Browning, Ill., on November 28, 1922, about ten months previously. The writer of the news article, not knowing the details of the bird-banding activities of the Government at Washington, concluded that the bird had been marked in that city.

When banded wild birds are found with a serial number and the abbreviation "Biol. Surv." stamped on one side and the abbreviated address "Wash. D. C." on the other, it does not mean that the bird so numbered was hatched in the American capital or that it was turned loose there. All bands bear this address in order that information regarding their recovery may be mailed to Washington, where, in the central office of the Biological Survey, records are kept of all the birds banded by about 850 cooperators of the bureau stationed in various parts of the country and holding permits to engage in the work of banding.

Anyone is likely to come across a banded bird which has met with an accident, especially during the fall shooting season. The bands are so small that they can only show the number of the bird and indicate that the Biological Survey should be notified—preferably by mailing the band itself to Washington with information regarding the place and date of its recovery. The sender of the information receives a card in a few days telling him where and when the bird was actually banded. Public cooperation in the matter will be a great aid in studies of the migration of birds.

FACTS OF CURRENT INTEREST.

Ducks and geese have been plentiful during the past open season and hunters have been well pleased with conditions.

Concentration of a number of deputies in southern California during early November resulted in a large number of cases being made.

President F. M. Newbert attended the meeting of the Advisory Board of the Migratory Bird Treaty Act and also the meeting of the American Game Protective Association in New York.

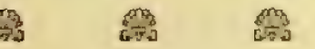
During late October and November the educational and publicity department gave 19 lectures in southern California, the total attendance being 9276. On one day in Los Angeles more than 2000 school children saw the educational films and heard a conservation lecture.

A compilation of the hunting accidents for 1922 and 1923, found on another page, brings vividly to mind the great toll of human life which results from carelessness.

During the fiscal year 1922-23, 1133 arrests for violation of the fish and game laws were made. Out of this total, 162 gave their nationality as from countries bordering on the Mediterranean.

The Biological Survey announces a new lure—oil of catnip—for trapping and poisoning mountain lions and bobcats.

Efforts made by W. T. Hornaday to get the Advisory Board of the Migratory Bird Treaty Act to cut all bag limits in half proved unsuccessful. Mr. Hornaday secured but one vote beside his own.



Deputies in southern California recently rounded up four night shooters who, upon conviction for killing geese, were fined a total of $900. Two men shooting waterfowl from motor boats on Buena Vista Lake were apprehended and fined $150 each.

COMMERCIAL FISHERY NOTES.

N. B. Scofield, Editor.

ALASKA CLAMS INVESTIGATED.

Two investigators for the United States Bureau of Fisheries, Dr. F. W. Weymouth of Stanford University, and Harlan B. Holmes, Scientific Assistant, spent last summer in a survey of the important clam beds near Cordova and Cook Inlet in Alaska. The data and the material collected will be utilized in the working out of the natural history of the razor clam. It is hoped that this will form a basis for legislation needed to give Alaskan clam beds proper protection.

ANOTHER "EAT MORE FISH" CAMPAIGN.

With the aid of the fishing industry the United States Bureau of Fisheries is planning to put on another "Eat more fish" campaign. Mrs. Evelyn Spencer, who was so successful in demonstration and lecture work during the war, has again been retained to handle the work. The industry is sorely in need of "consumers' demand" and since, through Mrs. Spencer's efforts several years ago, the city of St. Louis alone increased consumption of fish 25 per cent, following lectures and demonstrations of fish cookery in that city, it seems reasonable to believe that the aim will be attained. The publicity campaign will emphasize the point that fish is one of the most highly nutritious of foods; in fact, it contains more health-giving elements than many of the other foods in our markets today.

CONSERVATION IN OTHER STATES

IOWA VIOLATORS BENEFIT SCHOOL FUND.

A recent biennial report of the State Game Warden of Iowa shows a peculiar use of the fines extracted from fish and game violators. All monies obtained from such fines go into the county school fund instead of into a fish and game protective fund as they do in most states.

The same report shows that game breeding is becoming an established thing in that state for, during 1922, two hundred and sixty-five licenses were issued.

LAW ENFORCEMENT IN PENNSYLVANIA.

The State of Pennsylvania now has 64 county game protectors, with 5 assistant game protectors in some of the larger of the 67 counties and 9 supervisory officers, as well as a keeper for each refuge. In 1921, 2884 cases were made. Penalties have increased from $2,914.06 in 1919, to $69,963.25 in 1921.

A NEW ZEALAND REFUGE.

"One needs but to spend a week or two on Little Barrier Island to realize the success which has attended its isolation as a bird-sanctuary and the wisdom of the government of New Zealand in its policy of giving protection to our avifauna. Everywhere throughout the forest one is attended by one or more friendly species of birds, while from dawn to dusk the bush rings with the musical notes of the bell-bird and a chorus of others. Perhaps on this island the nearest approach to conditions in the New Zealand bush before the advent of the white man is to be had. At least one species of bird (the stitch-bird) quite extinct elsewhere is to be found in the dense forest of the Little Barrier, and appears to be increasing in numbers, whilst two species of kiwi intentionally transferred to the island have thoroughly established themselves. It is sincerely to be hoped, therefore, that, as opportunity offers, such birds as our native thrushes, crows, saddleback, the huia, if it still exists, and other birds peculiar to the New Zealand region and fast disappearing before the advance of settlement, will be transferred to this island sanctuary, where the species should continue to exist indefinitely while sweeping changes are being made in the avifauna of the mainland by the spread of the more aggressive exotic species."—W. R. B. Oliver, in *The New Zealand Journal of Science and Technology*, Vol. IV, No. 6, 1921–22.

CANADA WILL PROFIT FROM BUFFALO.

Recent statements by J. B. Harkin, Commissioner of Canadian National Parks, show that Canada has been wonderfully successful with its herd of buffalo. Beginning thirteen years ago with 709, the herd now numbers about 8000. The increase is so great from year to year—about 1500 calves—that it will be necessary to slaughter at least a thousand in order to prevent overstocking the

range. Including the purchase money, the erection of fencing, and general administration, the herd has cost about half a million dollars. The marketing of a thousand buffalo a year, there being good sale for heads, for hides and for the meat, will soon bring a revenue which will practically recoup the total expenditure. It is planned to make the meat into pemmican, the most valued of foods in the far north.

LIFE HISTORY NOTES.

OPOSSUMS NOW PLENTIFUL IN VENTURA COUNTY.

Opossums are now so common in northern Los Angeles County that one trapper last winter, a Mr. Snyder of Burbank, caught fifteen of these animals. They are abundant also from the mouth of the Santa Clara River well up into the mountains. Mr. Harry Wolf caught two and reports many others at Fillmore, California, 25 miles up the river from the McGrath ranch, where opossums have been taken. One was found in a lumber pile at Montalvo.

The ones caught here appear to me very much larger than those with which I am familiar in Georgia where I was raised.—GEORGE P. AUSTIN, Oxnard, Cal.

ANTELOPE AND MOUNTAIN SHEEP IN NEVADA.

At least sixteen National Forest officials, game wardens, and conservationists have cooperated with the writer in bringing together data on the distribution of antelope and mountain sheep in Nevada, presented herewith in the form of a distribution map. Thanks are due especially to Mr. E. R. Sans of the Biological Survey, whose interest in the Nevada antelope situation has produced a reasonably accurate census. For the most part his figures confirm reports from other sources.

Mr. J. G. Thompson of Tonopah, recently deceased, had reported one hundred and fifty mountain sheep in the "Twin Rivers District." This herd is not indicated on the map.

This distribution map is presented with the hope that it may elicit further information on the subjects covered. In the case of mountain sheep, at least, there remains much to be determined. Information which will help to connect or improve the map will be welcomed by the undersigned.—C. P. RUSSELL, Yosemite, California.

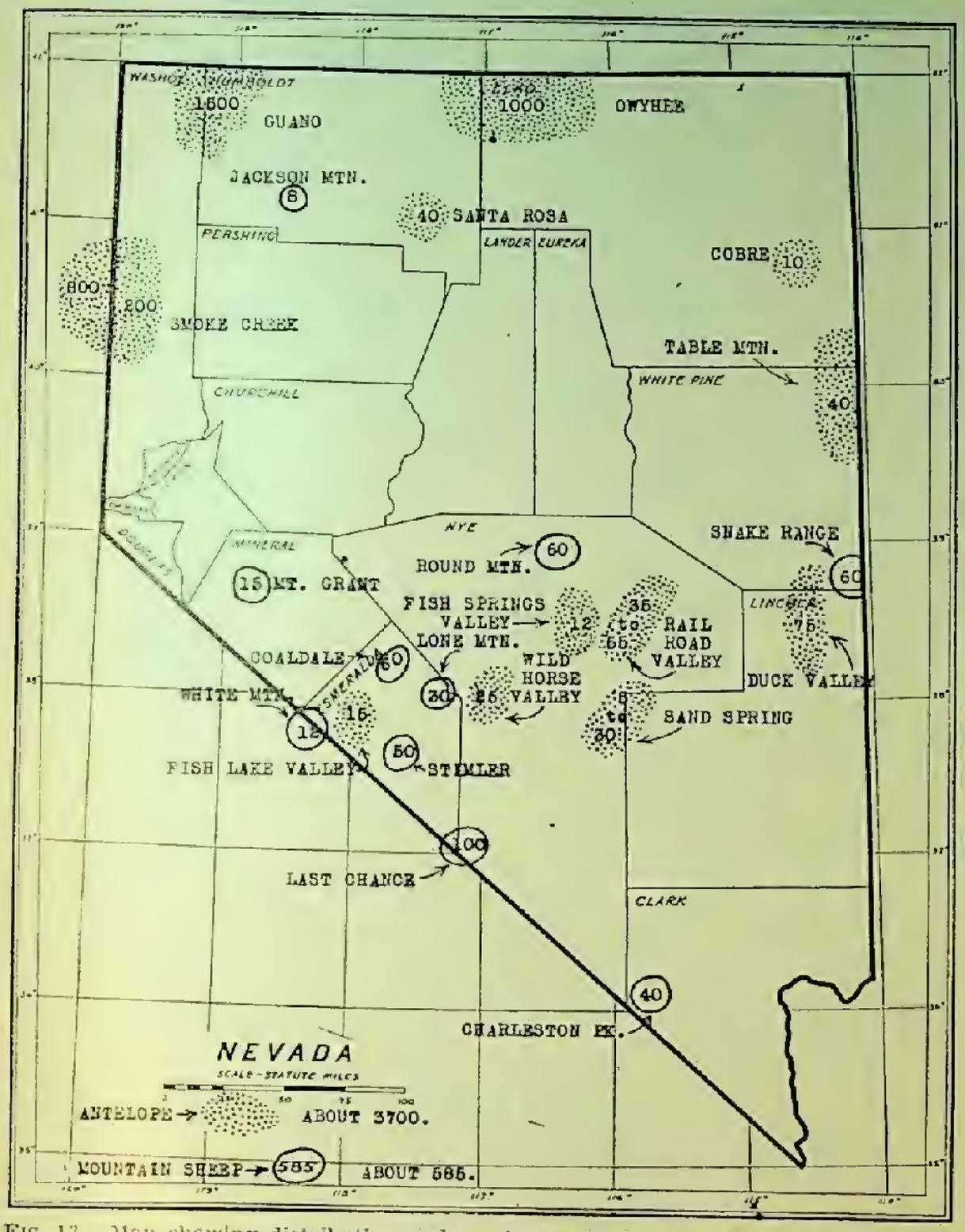


FIG. 13. Map showing distribution and numbers of antelope and mountain sheep in Nevada. Compiled by C. P. Russell.

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JULY, AUGUST AND SEPTEMBER, 1923.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego
Albacore											7,061,140	614	3,946,562	11,008,316		26,634
Anchovies							90,785		40,756		12,068			149,609		
Barracuda							24			13,820	923,263	802	256,100	1,194,009	59,103	14,908
Bluefish								247	8,755					9,002		
Boccaccio							4,807	67,863	97,024	685				170,379		
Bonito							480			1,438	282,856	28	23,505	308,347	7,117	2,500
Carp				160	289	5,618	1,914							7,981		
Catfish		414			20,015	2,563								22,992		
Chilipepper							753	13,144						13,837		
Cultus Cod	8,706	6,351					141,880	4,880	9,400					171,217		
Dolphin																
Eels																
Flounders				300			84,113		900		566			85,879		35
Grayfish							5,870				1,225		21,497	28,592		
Greenfish																
Hake							23,550							23,550		
Halibut	136,151	8,223	759				9,588	38	1,221	96,296	146,711	337	1,859	401,183	52,873	406,134
Hardhead					34									34		
Herring																
Knurfish							735	2,188	2,081	26	32,310		3,686	41,026		57
Mackerel							74	894	213,445	7,722	471,576	10,904	16,491	721,109	2,030	279
Marlin																
Mullet																
Perch	8,168		1,153			38	17,022	125	2,317	12	48,819	737	2,244	80,635		
Pike				4	80	644								728		
Pompano											5,152		3,019	8,241		
Rock Bass										1,224	82,816	2,379	35,388	121,807	1,398	197
Rockfish	1,225	1,250					134,034	32,012	81,669	7,223	138,655	6,347	136,435	541,850		145
Sablefish							25,188	90,190	3,174					118,552		
Salmon	1,225,387	126,826	14,507	351,762	300,282	940,965	152,488	46,424	19,725					3,811,366		
Sandabs							281,700	11,573	420		2,117			208,872		
Sardines							72,567	100	28,298,512		20,445		403,681	28,795,305		
Sculpin											1,700		1,781	3,481		
Sea Bass—Black										650	13,329	102	6,940	21,060	834	5,091
Sea Bass—White			1,357				12,250	2,202	408	84,557	534,779	7,109	21,838	664,560	23,514	263,273
Sea Trout					47								918	965		
Shad						3,580	130							3,710		
Shad—Buck																
Shad—Roe																

Sheepshead												305		95	400		
Skates							19,768								19,768		
Skipjack												3,175,769		1,403,308	4,579,077	7,958	39,416
Smelt	15,296		7,934				21,107	53,098	1,509	12,258	49,850		18,663	2,777	182,492		625
Sole	9,788						1,646,800	53,649	2,929	17,848	19,490		50		1,750,554	51	75
Splittail						800									800		
Striped Bass				4,273	781	92,996	33,632								131,682		
Stingaree																	
Suckers																	
Surf Fish																	
Swordfish												4,471		4,629	9,100		
Tomcod			424				17,753								18,177		
Trout—Farm																	
Trout—Steelhead	2,775														2,775		
Tuna												261,858	15		261,873	22,200	
Tuna—Bluefin												1,246,769		581,310	1,828,079		
Tuna—Yellowfin												322,987		105,629	428,616	432,592	1,088,350
Turbot	20		146				225								391		
Whitebait	8,333						15,019								23,352		
Whitefish												6,050		463	6,513		
Yellowtail											2,090	514,035	25	744,192	1,260,342	38,435	12,047
Miscellaneous	1,259			39	29	421	2,290	1,863	2,219	1,289	21,479		135		31,023	690	
Total Fish	1,420,408	443,064	26,280	356,538	321,537	1,047,625	3,122,906	386,492	28,816,524	247,147	16,302,670		48,307	7,724,410	0,263,908	648,855	1,857,636
Crustaceans:																	
Crabs	[1]20,160		[2]504				[3]13,488	724							34,176		
Ecrevisse																	
Shrimps			136,216				250,306								386,522		
Spiny Lobsters																	
Mollusks:																	
Abalones									555,387	1,902					557,289	18,004	
Clams—Cockle	290		2,621								1,269				4,186		
Clams—Mixed	2,200		1,512												3,712		
Clams—Pismo										68,677					68,677		
Clams—Softshell			20,160			35,948	21,833								77,941		
Cuttlefish							1,618	3,896	14,943						20,457		
Limpets																	
Mussels							2,118		900				22,800		25,818		
Oysters—Eastern			[4]61,281				[5]56,804								118,085		
Oysters—Native																	
Snails																	
Squid									135,701						135,701		
Miscellaneous:																	
Frogs																	
Terrapins					[6]960										960		
Turtles								960							960	142	
Totals	1,443,064	443,064	248,574	356,538	322,497	1,083,573	3,469,073	391,372	29,523,455	317,726	16,303,939		71,107	7,724,410	61,698,392	667,601	1,857,636

All amounts shown in pounds. Albacore and skipjack cleaned. [1]840 doz. [2]21 doz. [3]278,550 shell oysters. [4]562 doz. [5]40 doz. [6]258,200 shell oysters. [7]1 doz.

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FRANK J. SMITH, Superintendent
SACRAMENTO, 1924

1921 ABSTRACT SPORTING FISH AND GAME LAWS 1923

OPEN SEASON INCLUDES BOTH DATES GIVEN.

SPECIES	DISTRICT	OPEN SEASON	BAG LIMITS, POSSESSION LIMITS, ETC.
DEER	1-1½-4½ 23-24-25-26	Sept. 1-Oct. 15	Two Bucks per season. No Does, Fawns, or Spike Bucks. No sale of venison or skins.
	2-2½-3	Aug. 1-Sept. 14	
	4	Sept. 16-Oct. 15	
RABBITS (Cottontail and Bush)	ALL	Nov. 1-Jan. 15	15 per day, 30 per week
TREE SQUIRRELS	ALL	No Open Season	Closed until Sept. 1, 1925.
ELK, ANTELOPE, MOUNTAIN SHEEP	ALL	No Open Season	Killing Elk a felony.
SEA OTTER, BEAVER	ALL	No Open Season	$1,000 fine for Sea Otter.
BEAR, FUR ANIMALS	ALL	Oct. 15-Feb. 28	
DUCKS, GEESE, JACKSNIPE, MUD HENS	ALL	Oct. 1-Jan. 15	25 per day, except Geese. 8 Geese weekly limit. See law.
RAIL, WOODDUCK, PIGEONS, SHORE BIRDS	ALL	No Open Season	
QUAIL (Valley, Desert, Mountain)	ALL Except 1½	Nov. 1-Jan. 15	Valley, Desert, 15 per day. 30 per week. Mountain, 10 per day. 20 per week.
	1½	Oct. 15-Dec. 15	
SAGE HEN	ALL Except 4½	Aug. 1-Sept. 15	4 per day. 8 per week.
	4½	No Open Season	
DOVE	ALL	Sept. 1-Oct. 31	15 per day. 30 per week.
GROUSE	ALL	Sept. 15-Oct. 14	4 per day. 8 per week.
TROUT (Except Golden), WHITE FISH	1-1½-2-3-4-4½ Lake Almanor	May 1-Oct. 31	See Game Law Abstract.
	2½	July 1-Feb. 14	
	23-24-25	May 30-Oct. 31	
	Lakes, Etc.*	Aug. 1-Oct. 31	
	1½ Winter	Nov. 1-Dec. 31	
	2-3-10 Tidewater	Dec. 15-Feb. 28	
	2-2½-10 Spear	April 1-Jan. 31	
GOLDEN TROUT	ALL	June 30-Oct. 1	20 per day. None under 5 in.
BLACK BASS	ALL, Except 4e, Clear Lake	May 1-Nov. 30	25 per day. None under 7 in. No sale.
	4e, Clear Lake	No Closed Season	
SACRAMENTO PERCH, SUNFISH, CRAPPIE	ALL	May 1-Nov. 30	25 per day.
STRIPED BASS, SHAD	ALL	No Closed Season	See Game Abstract.
SALMON	ALL Except 15	No Closed Season	See Game Abstract.
	15	April 1-Aug. 31	
CRABS	ALL	Nov. 15-July 30	See Game Abstract.
ABALONES	ALL	Mar. 16-Jan. 14	See Game Abstract.
PISMO CLAMS	17	Sept. 1-April 30	See Game Abstract.
SPINY LOBSTER	ALL	Oct. 15-Feb. 28	See Game Abstract.

*Special provision; see Game Abstract.

HUNTING LICENSES

License Year from July 1 to June 30

Residents, $1.00. Non-residents, $10.00. Certain Aliens, $10.00. Other Aliens, $25.00.

ANGLING LICENSES

License Year from January 1 to December 31

Residents, $1.00. Non-Residents, $3.00. Aliens, $3.00.

TRAPPING LICENSES

License Year from July 1 to June 30

Citizens, $1.00. Aliens, $2.00.